

ON THE
REMOVAL OF STONE
FROM THE
BLADDER,
WITHOUT THE USE OF CUTTING INSTRUMENTS;
CONTAINING A
GENERAL REVIEW OF THE SUBJECT;
TOGETHER WITH A
Description and Plates of the Instruments
INVENTED BY DR. CIVIALE AND OTHERS,
AND
DETAILS AS TO THE MODE OF USING THEM.

BY H. G. BELINAYE, Esq.

“On y trouve, parmi une foule de procédés que l'opinion ensevelit en naissant dans les livres de leurs auteurs, quelques procédés heureux que le génie enfanta, que l'expérience a consacré.”

DESAULT, *Operation de la Taille.*

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TO

M. CIVIALE, M.D.

SIR,

UNTIL some more suitable opportunity should present itself, of acknowledging the politeness and liberality with which you enabled me to observe and study your excellent process for destroying urinary calculus, permit me to testify my feelings on the subject, by placing your name at the head of this little Essay.

I am not able to convey to my brother surgeons, in England, the circumstances which so much enhance the value of your new process, your manual dexterity in the use of the lithon-
triptor, and the many advantages it derives from your direction; but they will, no doubt, even without these, attach a value to the main facts of your salutary invention.

I have to apologize, most probably, for some inaccuracies as well as for the attempt

to suggest some slight improvements. In these matters, however, I submit to your correction; and as it is probable I may soon have to offer a report of cases, and further remarks, I shall then most willingly acknowledge the defects in the present volume which you may suggest in the interim.

I remain,

SIR,

Your obedient

and obliged servant,

H. G. BELINAYE.

P. S. I beg you will present my sincere acknowledgments to the Professor ORFILA, to whose kindness I owe the pleasure of your acquaintance; and whose courtesy and liberal feeling, I have had an opportunity of learning, are equal to his scientific fame.

26, *Foley Place, London,*
August 25th, 1825.

PREFACE.

THE Author of the little volume now presented to the public, having formerly been occupied by the attempt to invent an instrument for extracting calculi from the bladder, without the ministration of the knife, has most sedulously observed and followed up the discoveries which have altogether set aside his more tardy and less ingenious invention. At the conclusion of our summer medical campaign, the writer seized the first opportunity of going to Paris, to observe the new improvements in this important branch of surgery, and was fortunate enough to witness the proceedings of M. Civiale, whose lithonriptor has vindicated so much of public attention and interest. No designs of this instrument, nor even any accurate description of this new and beneficial engine, having appeared as yet on this

side of the Channel, he thinks the present work, in which an account and delineations of the lithon- triptor are undertaken, will not prove unacceptable to the members of his profession, nor to those amongst their patients who prefer enduring the torments of a calculous disease to submitting to a painful operation. For the convenience of those surgeons who wish to turn their attention to the subject, he has encircled within this diminutive volume an account of most of the means that have been brought forward to avoid the employment of cutting instruments, in treating stone in the bladder. No one, he thinks, can fail to feel satisfaction in recurring to the important masterly suggestions of Mr. James Arnott, and in observing the useful and ingenious devices, by means of which that excellent mechanist Mr. Weiss has substantiated the conceptions of celebrated surgeons. All these new methods of relieving a most cruel disease, form together a most imposing body of new acquirements, and an accession most important to the art of surgery. Should the reader fortunately concur in this opi-

nion, even this rough sketch will have its value, and will require no further apology for its introduction to public notice. One or two instruments of less importance, many suggestions, and, as he hopes, some improvements, in operating and in general practice, the writer has attempted to offer in the following pages. For them, and for the criticisms contained in this hurried essay, he solicits diffidently a favourable judgment.

Foley Place, August, 1825.

AN ESSAY,

&c. &c.

CHAPTER I.

INTRODUCTION—DANGERS OF LITHOTOMY—
DEFECTS OF INSTRUMENTS—SUPERIORITY
OF THE KNIFE.

If there is a sentiment which should be paramount to all others, where the interest of the progress of knowledge is concerned, it is the firm opinion that the degree of improvement we have attained, however considerable it may appear, is only a state of transition to an epoch of greater improvement, leading us on to greater still. There is no study in which this opinion of the indefinite susceptibility of improvement in art, should be more resolutely upheld than in that of surgery. Surgery, in the more contracted and unphilosophical acceptation of the term, applied to it even by the mass of the better-informed

members of society, is the art of employing only violent evils, in remedying accidental or morbid mischiefs more violent still. Within the last eighty years, surgeons have been gradually but most decidedly emancipating themselves from the trammels of opinion, and ceasing to consider themselves as mere executioners, called in blindly to perform a bloody office, when the patient's sentence is passed; they pretend now to the exercise of that judgment of which prejudice had deprived them.* We look upon surgical means as frequently only the last and worst of those resources which the healing art supplies; and we must consider many of its operations as evils, calling for the alleviation which time and industry will most probably afford—evils which will perhaps appear as preposterous to posterity, as the rending asunder a comminuted limb, and the application of boiling oil to its bleeding.

* The reason why the offices of physician and surgeon were originally so arbitrarily separated, was, that medicine was exercised principally by the priesthood, who were forbidden to shed blood; an adherence to the *letter* of which law caused warlike bishops to go to battle, armed only with a club, like the Bishop of Beauvais, at the battle of Bouvines. In France, this error has been of late recognized, and all surgeons there take their degrees as physicians.

stump, appeared to the successors of the excellent Ambrose Paré.

Directing their thoughts towards those improvements, which have transformed surgery from an art of unceasing cruelty, into a beneficial ministry of comparative gentleness, and requiring a distinguished degree of judgment and acumen, it is not astonishing that surgeons should have particularly turned their attention towards simplifying so severe and dangerous an operation as that of lithotomy. Even those persons who live without the pale of the surgical profession, must read with interest the varying forms and fates of this operation, and witness with astonishment all the great and more frequently abortive efforts made by medical men, of every age and country, towards the fulfilment of this desired object. The mere fact of a multiplicity of remedies being proposed and adopted, in surgery as well as in medicine, is almost always a just criterion by which to decide of the comparative inefficacy of the means we possess. Even till within the most recent period, notwithstanding great and decided improvements introduced into operations for the stone, fatal events have been frequent, serious mutilations have been still more often met with, and every surgeon, according to

his national or private prejudices, or according to the fashion of the day, has wielded his bistouri caché, his cystotome, his blunt or sharp gorget, his scalpel, or his favourite knife, and has anathematized every other mode of performing lithotomy but his own.

However laconic it may be my intention to make this work, which, written on the spur of the moment, I cannot hope should recommend itself but by the humble utility of its object, it is necessary I should briefly review the different operations for removing stone from the bladder; as without this I cannot do justice to my future views. In doing this, I shall be enabled to state the objections to which each mode of operating is liable; and I shall afterwards observe upon the great evils which all of them equally give rise to. Before I proceed, let me however observe, that I am not led, by the enthusiasm of the moment for novel and attractive modes of operating, to a preposterous attempt to subvert, by an opinion so little influential as my own, established routines highly valued by the brightest ornaments of our profession. 1°. The objections to the modes of operating have been long ago stated by men of distinguished talents and of great weight in the world of science, and with expressions of regret

which would at the present moment, I think, be unnecessary. 2°. It is acknowledged on all sides, and by the most sanguine persons, that cutting for the stone must always remain, in some peculiar cases, the last resource of the surgeon and of the patient; and all that is to be depended upon, is the certainty of reducing these cases to a very small number, and of preventing, in the greater proportion of them, fruitless effusion of blood, as also needless loss of human lives. If any one could suspect the promoters of the new modes of operating of being misled by false hopes and overweening confidence, I should still be loath to imagine that the prejudice inspired by the force of habit could make any surgeon of liberal education adhere to old and more severe routines, and, by clouding the medium of his judgment, engender those prejudices which must be fatal to the best discoveries when in their infancy. On the contrary, we are most happy to observe that some of the leading members of our profession have sanctioned and employed some of the new instruments, whose utility it is the object of this work to develop.

To fulfil our task of animadversion, we must just throw a glance on the proceedings which are always adopted in all ordinary lithotomical

operations. We suppose then the wretched patient, a prey to the most agonizing feelings, and subjected to the most awful of the precautionary measures adopted in surgery, is placed, blindfolded, bound hand and foot, upon the operating table, with his body secured in the hands of assistants, and his breech raised conveniently on a level with the surgeon's breast, &c.

The first instrument introduced into the bladder, and this is done the first thing on account of the spasm of the urethra created by the feelings of the patient, rendering its later introduction more difficult, is the staff. Of the objections to this instrument, little can be said without trenching upon what we have to observe upon the gorget. We will however remark, that as this instrument is much more curved than a catheter, in order that it may be better felt in the perineum, and that it may give a direction to the other instrument employed more in the axis of the bladder, this very circumstance of its shape renders it more difficult for the instrument to adhere to its groove. It may, therefore, from this peculiarity of shape, slip from the staff and pierce or violently bruise the bladder itself or some adjacent part; or the same disaster may arise from the length which is absolutely required in the staff to

bear the instrument fairly into the bladder, and which, without the utmost precaution and dexterity, will bring it in collision with its unresisting parietes. When the first incisions are made, the assistant holds the staff, and the correctness of the proceedings depends much upon his acumen. When the gorget is lodged in the groove, and the surgeon, taking the staff in his hand, is to perform the coup-de-maitre, every thing depends upon the just co-operation of his right and left hands. Whatever may be said of surgeons being ambidextrous, such coup-de-mains must remain doubtful in their result, when we consider how different are the habits of volition, and the powers and muscular capacities produced by custom in these resembling members of the human body.

Langenbeck and Klein have laid stress upon the shape of the handle of the staff; others have dilated upon its curve; others on its point; and all have contributed to prove the importance of its minutiae, or, in other words, have pointed out the great danger to which its use is liable. It is, however, an indispensable instrument in every species of *cutting* operation for the stone, and is open to infinitely fewer objections than some of its satellites in lithotomy.

To what we have to urge against such instruments as we are proceeding to notice, it may probably be answered, that the most felicitous operations are performed every day with the worst. This is indeed true ; and we even think that men so experienced and so gifted as an Astley Cooper, an Abernethy, or a Bell, might with a carving knife perform amputation, or with a pen-knife the operation for hernia. But it is self evident that no instruments or modes of operating can be defended on such grounds, and that it would be better none should exist than that they should do wonders in the hands of a few individuals, and prove destructive in the hands of the greater number. A proper surgical instrument is such as only requires from an operator the ordinary qualifications requisite for a surgeon. We have neither time nor space to point out fully the baneful consequences that have been, and will probably always be, produced by the forgetfulness of this simple truth.

Almost every leading surgeon has had some favourite instrument, and many destructive imitators ; and modes of operating successfully, practised by some famous operators, have, at their death, been imagined to be lost, or to be misrepresented, because in other hands they were no

longer successful. As, for example, at the death of Raw, who, with great eclat, had cut 1500 patients for the stone, Heister and Albinus, his pupils, tried each to give a new explanation of the process he adopted ; because neither of them was so successful as he*.

The next thing we have to do, is to throw a rapid glance of scrutiny on the different kinds of cutting instruments used in lithotomy. Fortunately, taken under their general denominations, these are few ; though their modifications are numberless. It is a very remarkable circumstance in the history of lithotomy, that not only the first forms in which we see it employed should have been exceedingly rough and hazardous, but that, at a time when every art and science was improving, a new mode of operating for

* Let those who wish to convince themselves of the immense difference the dexterity of the surgeon and the knowledge he possesses of the susceptibilities of his favourite instrument, establish between success of any particular method in the hands of one person and in those of another—let these persons compare the results of former operations for the stone to those of our days. The ignorant Frere Jacques, when, with the advice of some regular surgeons, he had improved his mode of operating, cut thirty-eight patients without losing one ; and Cheselden lost only two out of fifty-two !

stone should have been invented, infinitely more fatal, absurd, and complicated, than its first prototype. The Celsian method, the first we have on record, was succeeded, in 1520, by Romanis, the Cremonan physician's apparatus major, in which the number of instruments was increased, and in which also the operation of dilating and tearing the bladder was added to the former incision. These operations are, fortunately, in our days exploded; but the fate of the art has continued throughout the same.

In 1561, Peter Franco gave the better suggestion of the high operation of the stone; and after him, another surgeon of eminence more zealously urged its adoption. Still in England it was never employed till the beginning of the eighteenth century, when Douglas performed it. The absurd apparatus major continued to preserve a paramount superiority to the former, until, and even some time after, the year 1697, when Frere Jacques appeared in the French capital, and first showed the rude example of the present improved lateral operation. Foubert, at a more recent period, preserved in his own plan, which had also its vogue, one of the worst parts of the old mode of operating, namely, the forcible dilation of the bladder. The capricious folly of lithotomists was

not fated to end here ; for, after Cheselden had improved the operation of Frere Jacques, so that it merited the appellation of the glory of English surgery, his implements of success were abandoned for others infinitely more susceptible of erroneous management. Hawkins turned the secondary instrument, the conductor, of Cheselden into a primary engine in lithotomy, by imparting an edge to one of its blunt sides.

In our days the gorget still disputes the pre-eminence with the more simple and manageable knife of Cheselden, and those which more nearly resemble it, as well as with the bistouri caché, brought forward in 1743 by the Frere Cosme. The apparatus, major and minor, being now abrogated, we have only to occupy ourselves with the cutting instruments employed in the high operation, and in the lateral section. We will consider the gorget and bistouri caché, and then speak of the other more simple knives.

Did our time and space allow, by collecting all the anathemas which celebrated surgical writers have pronounced against each other's favourite form of gorget, whilst vaunting their own hobby, we might be saved the trouble of proving the many defects to which this much-favoured instrument is liable. From the time

when Hawkins first made a knife out of what was never intended but for a conductor, every leading surgeon in England, France, Italy, and Germany, has unceasingly altered the form of the gorget. We have under our eyes the improved forms recommended by Cline and Abernethy. Desault diminished the concavity of Hawkins's gorget, altered its point, its edge, its handle. The veteran Scarpa has indulged himself in writing a clever volume on the same subject; where even the degrees of the angle formed by the instrument with its handle are most minutely, and not uselessly, regulated. The German surgeons have also their own favourite gorget: but as their best lithotomists condemn altogether the instrument, we will not expatiate on the subject.

The boundary of our duty is to sum up more generally the defects of the gorget.

As every body well knows, our most cutting instruments, when viewed by the microscope, are merely saws of exceeding fineness; it stands then to reason, that if our sharpest knives are applied to a part we wish to sever immediately from above, and without any withdrawing motion, the incision can only be effected by force and with accompanying contusion and laceration. How much greater must these effects be when

such an instrument as the gorget is thrust into so tough a viscus as the bladder or prostate. It will produce greater evil, on the same principle as the thrust of a bayonet or of a small sword produces greater mischief than the cut of a sabre.

The gorget may be made partly blunt, or may be made sharp on both sides ; if the former, the laceration and contusion are increased ; if the latter, not only the pudic artery, but the important appendages of the bladder are threatened with injury. The gorget is either broad or narrow. If it is broad, great danger of hæmorrhage exists ; above all, as the size of the incision cannot be made to answer the greater or less breadth of the parts in the patient. If the gorget is narrow, through the incision the stone cannot be extracted ; an occurrence which has taken place even when one of the greatest width has been used. Should the gorget be flat, the blood vessels are again endangered ; if concave, a circular flap will be formed, which will probably obstruct the flow of urine and produce the serious mischief of extravasation of urine into the cellular membrane*. The edge of the gorget has been made

* This destructive consequence follows more frequently than is in general imagined, after the lateral operation ; for it is

reflected backwards, forwards, and in every direction, to gain room for the extraction of the stone, to avoid the artery, &c. ; but no instrument of the kind can answer so many opposite intentions. The gorget is thrust at once, per force, out of sight into the bladder, and the cleverest surgeon seeks afterwards whether it has reached its destination, just as a marksman, when he has fired his gun, goes to examine whether his bullet has lodged in the target. In the same manner as the latter will often find that he has missed his aim, the former will also discover, occasionally, that he has lodged his instrument between the bladder and rectum *; that the blade

looked upon as the result of the hypogastric section. The tumefaction of the parts after the lateral operation is frequently so great as nearly to close the wound, and by opposing the free exit of the urine, forces it into the cellular membrane. For cases of this kind, see *Journal of Foreign Medicine*, No. IX. Mr. Key says, that in all the cases he has seen examined after death from lithotomy, suppuration of the reticular texture surrounding the bladder existed.

* Those who wish to read an illustrative case, may refer to p. 148 of Howship on the Diseases of the Urine, and they will see there an operator slipping a broad double-edged gorget between bladder and rectum, and afterwards fumbling long and obstinately in this artificial cavity with the forceps to find a stone.

of the instrument has severed the bowel; that its beak, slipping from the staff, has pierced the parietes of the bladder, &c. &c. Such examples are numerous, as well as instances of fatal wounds of the pudendal artery. The great German lithotomist, Klein, acknowledges having himself cut the internal pudic with the gorget, and he has abandoned its use for the scalpel. Such confessions are not numerous, but are not required for our instruction, when our eyes have such frequent opportunities of communicating to us the important information. We shall not dilate on the minor evils of making false passages, by the gorget leaving the groove of the staff; the difficulty of making the external and internal wounds correspond; the difficulty also of withdrawing the gorget when once introduced, without further incision, laceration, &c. &c. What we have already seen must I think suffice to the conviction of any unbiassed understanding. Those who will employ the gorget, find in their lithotomy case a due number and variety of gorgets, and I would advise them to append to one end of each of these instruments a label, containing the written commendations of its particular form, and to the other end the no less decided condemnation pronounced on it by others. They may

then, before operating, balance the instrument between the pro and con, and we wish them a felicitous and speedy decision. The greater number, I am afraid, must see, in so prolonged and so voluminous a controversy, many powerful reasons for altogether rejecting the instrument*.

The lithotome caché, the next instrument of which we have to speak, is open to less animadversion than the gorget; but its defects are still neither few nor unimportant. In the judgment of many surgeons, it has all the disadvantages of the simpler knife, and certainly it has many faults which the latter has not. When introduced into the bladder it is a blunt instrument, and does not cut its way, but forces it in like the gorget; and not only it may part like the latter from the staff, and perforate the rectum and bladder, but, as its blade and handle are on the same line, it is more difficult to keep it in contact with the staff, and it requires an awkward degree of depression of the

* Not happening to have by me, whilst writing this hasty sketch, the excellent Principles of Surgery of J. Bell, I have probably omitted many stronger objections of this accomplished surgeon relating to the gorget; but his work may be referred to by those who seek conviction.

hand at the moment it is introduced to preserve it in its place. When the instrument is introduced, if it be not fairly in the bladder, its incision will be insufficient : if, on the other hand, it be quite *home*, and the viscus is not particularly full and large, at the opening of the blade, the greater degree of divergence being at the extremity, the bladder will be once more injured*. The blade of the lithotome allows of being carried out from five to fifteen lines : a third of this is sufficient for accomplishing the division of the prostate ; and experienced surgeons even assert, that at five or seven lines the incision will be greater than when more open. “ The degree of divergence is to be decided on from the operator’s opinion of the size of the stone ;” but the least tremor or false movement of the surgeon’s hand, the least mis-calculation easily occurring, where not only the number of lines, but the stem

* If we reflect that, in persons suffering from the stone, the coats of the bladder are thickened, and its area thereby often contracted, and that it is a viscus whose size is uncertain, since, according to circumstances, it may be of the size of an orange, though when fully distended it is more voluminous than the largest melon, and extends to the umbilicus, this last objection to the bistouri caché will appear any thing but frivolous.

of the instrument is to be taken into account, will make him cut those parts, which are the shoals and rocks on which lithotomists are wrecked. The best mode of operating is to make as large an opening for the egress of the stone and free flow of the urine, as the safety of the neighbouring parts will allow : the lithotome caché was designed to effect this at one stroke. It is however any thing but probable that the surgeon will judge of the exact divergence of the instrument capable of accomplishing an incision, which must be adapted to the size of the parts, which naturally vary infinitely according to the age, and stature, and peculiarities of conformation of the patient. I have seen the lithotome caché most fortunately employed by one or two hospital surgeons ; but it is not an instrument that always answers in their hands ; much less can it be trusted to the hands of junior surgeons, with a certainty of their performing, without disaster, the exact incision required. The opinion I humbly express, was that of the well-known French surgeon Louis, to be found in the “ *Mémoires de l'Académie de Chirurgie*,” tom. iii. containing his report to that assembly on the different operations for the stone. He says there, that the report he has just made on the “ litho-

tome caché, shews the insecurity of the instrument, and how incorrect it is to say that it may be put in the hands of all surgeons with a certainty of their performing good operations. It requires," he adds, "infinitely more precaution to avoid the dangers which may result from its use, than is necessary to guide properly the instruments already in use. They are much simpler, and we feel more secure that they will do no more than we wish them to do. The lithotome is therefore no new treasure discovered by art," &c. &c. Those who wish to enter more fully into the subject may refer to these excellent Memoirs. We can only, in conclusion, say, that if the peculiar advantages of this instrument are imaginary, considered as a mere knife, it is a very bad one.

The simpler form of knives possess many evident advantages over those we have as yet spoken of. It is to the knife that we must ever have recourse, where no resource of our art can be discovered which can avail in relieving the patient. At the same time many considerations direct us to seek for a surer method, were the sufferings produced by it not a sufficient reason. However wayward may be the minds of men, it is not to be thought that they should have de-

viated from the use of the knife, and have seized with such avidity the gorget or lithotome, had not the former instrument often figured in scenes of a melancholy and fatal nature. Those who have so justly upheld the reputation of the knife, have not, however, agreed upon its form. Frere Jacques originally used a dagger-shaped knife; Cheselden, if I mistake not, employed one with a point and a convex edge, resembling in miniature a Damascene sabre. We have in England the scalpel and the narrow-beaked knife of Mr. T. Blizard. The German surgeons use the bistouri and the scalpel; and Langenbeck, a well-known lithotomist, uses a knife of his own, pointed, with a broad short blade, to which a sliding back is affixed. Frere Jacques and Cheselden's knives are now out of vogue. Our pointed instruments with difficulty glide into the bladder, and often slip when force is applied, and break their points, and our beaked instruments have the defect of not cutting their way into the urinary cyst. Langenbeck's knife has not these disadvantages; but it is not so convenient as the longer bladed instruments, nor so well adapted as a narrow one for making as short or as broad an incision as the circumstances of the case may require.

In the first part of the operation with the knife, cutting too much of the membranous part of the urethra and the section of the artery are the terror of the junior lithotomist, and occasionally the misfortune of older surgeons. Afterwards may be wounded, the rectum (for which accident we have the remedy recommended by Desault, of slitting, from the wound to the end of the bowel !), the parietes of the bladder, and the vesiculæ seminales. The blood vessels to be encountered in the lower operation are more than one : we have the common pudic, its transverse perineal branch, the deep branch going to the bulb, and the plexus of small vessels round the neck of the bladder. It is needless to say how dangerous it is to wound the first, and the second, which few have the misfortune to encounter. The perineal branch is almost always cut, and, though rarely of any consequence, when disease of the neighbouring parts **has** augmented its caliber, or when it is large from the peculiar conformation of the individual, its division may prove more than troublesome. From the enlarged plexus round the neck of the diseased bladder, a very unpropitious oozing may take place, weakening the patient, and filling the bladder with clots that obstruct the urine's passage. In reading cases

of lithotomy, it has appeared to me that this occurs much more frequently than is generally suspected, where hemorrhage * has been fatal.

The number of important parts that may be injured in the lateral operation, has induced many to prefer the hypogastric section. This predilection of some surgeons is also well grounded, on the absolute impossibility, of withdrawing a very voluminous stone through the largest incision that can be safely made in the lateral operation ; whilst the space for incision is greater above the pubis, and the membranous part of the bladder will allow of dilatation, which the prostatic with difficulty can ; and the hypogastric section also appears preferable when the prostate is seriously diseased. Setting aside the cases in which the lateral operation cannot be performed for the latter reasons, it is difficult to hold the balance between the two operations, and decide which is best. The high operation is fraught, like every cutting operation for the stone, with difficulties and dangers ; and amongst these we will enumerate the frequent contracted state of the bladder in cases of stone,

* Richerand treats this opinion very lightly. See Lithotomie in the Nosographie Chirurgicale.

which does not allow it to rise sufficiently above the pubis, to offer a sufficient surface clear of the duplicature of the great abdominal membrane; the danger of extravasation of urine; the fear of wounding the peritoneum; and, lastly, the double incision, where the sonde de dard* is employed.

We have omitted to speak of the lithotomy forceps; and we will now say that they decidedly exasperate the wound, sometimes contuse the opposite side of the bladder, when introduced too far, or when slipping in with a jerk, and that the internal membrane is not unfrequently caught and lacerated between its chaps. It cannot be forgotten that it increases considerably the volume of the stone to be withdrawn, and the consequent contusion, even when the calculus is small, if the latter has slipped down near the bottom of the angle, formed by the two branches of the instrument: the branches will diverge less for a large stone, at its points, than for a small one at the angle. No man can doubt, says a justly esteemed elementary writer†, “that the injury

* There is a proposal in the little Essay on Lithotomy at the end of Mr. J. Arnott's second work on the Dilator, which should entirely supersede the use of the sonde de dard.

† S. Cooper.

which the bladder suffers, frequently, from reiterated and awkward movements of the forceps, is not an uncommon cause of the inflammation of the abdominal viscera, terminating in death.”

There is another operation for removing the stone which we have omitted mentioning, which is not so unadvisable as appears at first thoughts. This is the recto-vesical section, or that in which the incision is made from within the rectum into the bladder, in that triangular space, bounded laterally by the vesiculæ seminales, and inferiorly by the prostate. This operation is little practised in France, where it was first invented, and still less in England. We might, however, be inclined to judge it favourably, were it only on account of its being patronized by the illustrious Scarpa*, who, if I mistake not, has written on the subject a letter, inserted in one of our periodical journals. The evils that may en-

* It is perhaps not generally known, that this admirable surgeon, not satisfied with having acquired so pre-eminent a reputation in his particular art, by his practice and writings, has lately shown his knowledge as an antiquary, and as a lover of the fine arts, by a dissertation on a finely chiselled antique weapon in his possession.—Vide Lettera Sopra un Elmo di Ferro, &c. Pavia, 1824.

sue from this operation, are injury of the vesiculæ seminales and fistulous opening into the bladder. As the former produces impotency, and as in the latter case there are the fæces continually threatening to fill the bladder, the consequences are very serious. In the Memoir of M. Breschet, in the Archives Generales for July 1824, to which we beg leave to refer the reader, ninety-six persons are reported to have been operated, thirteen to have died; out of these several are said to have died of diseases distinct from the consequences of the operation. This estimate, which, taking the writer's possible partiality into account, is more favourable than the common average success in other operations, is brought to pretty nearly an equal balance, from a consideration of the number of eight having continued to suffer afterwards from fistula. It possesses the advantage of being performed with a simple form of knife; a circumstance which alone must confer a great degree of security on every operation; for, in proportion as the means employed are complicated, the results also must be complicated and doubtful. It is one of the best proofs of the improving state of the surgical art in our days, that the converts to this opinion are constantly increasing. John Bell has strongly advo-

cated the opinions of the great Cheselden : and the gifted brother of the former lamented surgeon has not been less strenuous in his exhortations. The works of A. Burns, Allan, Thompson, S. Cooper, of the German lithotomists, Klein and Langenbeck, and the more recent publication of Mr. Aston Key, are records of judgment and talent, which must be fatal to the mistaken partiality for more destructive instruments.

The superior advantages of the knife are,

1°. That, in dexterous hands, it cuts neither more nor less than desirable.

2°. That it cuts its way into the bladder, and that therefore it is not subject to be arrested for a moment, like the gorget or bistouri caché, by the tough parts first encountered at the neck of the bladder, and then to plunge forwards with unrestrained violence ; that therefore, also, it causes less contusion and laceration.

3°. That it gets slowly into the bladder, and does not require those dangerous “ *mouvements de totalité**,” in which, if instruments, hands, and mind do not harmonize, destruction must ensue.

* An excellent characteristic expression of Richerand.

4°. That it is not so broad as the gorget, and may be inclined right or left with comparative ease.

5°. That its handle also is more simple, and gives a better hold, and does not demand two movements of the hand from the operator, one to direct its course and the other to keep down a spring.

These are a *few* of the arguments in favour of the knife. In the works of Messrs. Bell, and of Mr. Aston Key, excellent modes of operating will be found. Beginners in lithotomy will find one adapted to their object in Mr. Allan Burns' Memoir.

As the greater number of cases, where the operation of lithotomy may be required at a future period, will be those in which there is great disease in the prostate and neck of the bladder, or in which a very large stone has formed, the high operation will be most frequently required; and if the jointed instrument of Mr. Arnott is found to answer the purpose of the *sonde de dard*, the operation, with the use of his syphon catheter* after it, will be exceedingly simple, and more generally successful.

* The amiable and distinguished colleague of Richerand,

at La Charité, has invented an ingenious instrument for continually sucking away the urine and preventing extravasation after the high operation. I should give a design of it, if this gentleman did not intend to offer it himself to the public, in a treatise he is preparing on urinary diseases. The instrument is more voluminous than Arnott's syphon.

CHAPTER II.

RECAPITULATION—REMOTE CONSEQUENCES OF IMPORTANCE DERIVED FROM THOSE THAT ARE MANIFEST.

THE jarring opinions of authors, the titles alone of whose multitudinous publications would fill a little volume like the present, sufficiently prove how doubtful and how precarious, at best, are the resources lithotomy presents to the members of the surgical profession. Supposing that, though objectionable on particular grounds, each form of operation for the stone might in appropriate cases be applicable and beneficial, they require such a minute anatomical knowledge, and, what is more difficultly attained, so steady and still so flexile a hand, and so much experience, that, at all events, the first operations performed by the surgeon must be pregnant with the most imminent danger to the patient, and to the operator's reputation. Success in lithotomy appears indeed to depend rather upon a fortunate star than upon more reasoned causes; since he

who is recorded to have best succeeded in lithotomy, was member of an inferior order of ignorant friars, and is represented by his contemporaries as being himself exceedingly ignorant, even of anatomy. With us, however, there are still endless twists and turns to be observed; and it is the least deviation or inclination of the hand to the right or left which is to determine whether the patient will remain impotent, will have his bowel severed, or die of hemorrhage.

Leaving now the consideration of the particular operations for the stone, and setting aside the instruments with which they are performed, to be condemned individually and unsparingly by greater surgeons—the bistouri caché by the English, the gorget by the Germans, the knife by the French—we will proceed to consider the effects produced by them all equally. There are two decided and manifest objections to all operations for the stone with cutting instruments.

1°. The exceeding severity of the operation.

2°. The number of deaths by this process.

In speaking of the first great objection, many persons will at first sight imagine that I mean merely to dilate on all the sufferings which patients must undergo; before the operation, by anticipation; whilst it is performing, by the

most cruel lesions of their persons ; afterwards, by their consequences ; and throughout by the apprehension of a horrible death. To these considerations I do full justice ; and sincerely believing that our habits of life in steadying our minds and hands in the midst of the bitterest scenes of wo, take nothing from the humane dispositions of our hearts, I am sure every surgeon would join in the wish for some redeeming invention, for this first reason alone. But this objection to lithotomy is self evident, and need not have been mentioned, except to exonerate *us* from forgetfulness of our fellow creatures' sufferings : the severity of the operation of lithotomy produces other baneful consequences :—

1°. That many prefer rather to die than to submit to it.

2°. That it is only in the most urgent state of disease that patients apply for relief.

3°. That it is the cause that the stone is often found too large to be extracted.

4°. That it gives rise to exceeding depression of mind, rendering every case unfavourable.

It is any thing but a rare case to find men who prefer death to lithotomy. Amongst the author's own connexions such an example long ago presented itself. A gentleman who was

highly valued for his learning, and still more for his sociable qualities, goaded by his sufferings, called upon a surgeon to settle a day for the operation. It happened that the latter was then operating upon another individual for the same complaint, and the patient died under the knife. The gentleman returned home, and would no longer submit to have his stone extracted by such dangerous means ; and, after long and acute sufferings, he died of strangury. But we have a better-known example, recorded by recent history, in the person of D'Alembert. This philosophic, this strong-minded metaphysician would never submit to be operated upon ; and his death from this malady deprived literature and science of one of its brightest ornaments. It would be loss of time to cite more examples. Let every man commune in truth with his own feelings, and question himself as to what *he* would do if labouring under this complaint.

It is an admirable dispensation of Providence, that our sufferings will frequently supply us with that courage which, without this stimulus, we should be incapable of mustering to our aid. But it is only when we have long endured one evil, that we submit to another, for the time much greater, that will remove it. The bladder,

irritated by the presence of a stone, becomes thickened in its membranous structure; the apparatus of urinary secretion becomes disordered; suppression of urine, or retention, may take place; a vitiated mucus or pus is secreted; the cyst closes more and more, as it thickens, on the stone, which rolling besides in every evacuation, or being pressed against the neck of the bladder, ulcers arise, and the prostate becomes diseased; or in other cases the stone is pushed through the fibres of the bladder, and becomes encysted. It is at the acme of their sufferings, and at some of the advanced stages of disease from irritation, or after the stone has been produced by the impediment to the urine from primary disease of the prostate, that patients most frequently apply to surgeons. Is it, may I ask, a rule of our art to cut into parts disorganized, where the powers of life are weakened*? Still surgeons must, in lithotomy, incise so morbid a viscus; though if they had to amputate a diseased limb, they would fear to leave behind the least portion of unhealthy

* Every good author gives the most urgent advice to operate as soon as possible, before the patient's chance of a favourable issue is lost from further disease—a sufficient proof of what frequently occurs.

flesh, lest it should never heal. Is it not from the morbid state of the bladder that secondary hemorrhage is so much more surely fatal than primary hemorrhage? I leave it to the reader's impartial judgment to deduct his argument from these questions.

One of the great sources of embarrassment and mischief in lithotomy, is the size of the stone, which either cannot be extracted, or is removed only with the employment of force, and the creation of contusions and lacerations*! Is it not evident, that if a gentler mode of operating were generally known, the stone would never be of a voluminous size, and also that small foreign bodies, accidentally entering the bladder, would not be left there by the timid individual to become a nucleus of stone, and an engine of disease†.

* There are several cases on record where, after the incisions were made, the stone could not be withdrawn and the patient died. In one of these the stone weighed fifty-one ounces; in the other, forty-four. The cases in question are related in the Philosophical Transactions, and are alluded to in Mr. Howship's work, p. 144. One cannot read this compendious treatise on the diseases of the urine, without wishing that all medical authors could imitate its order and perspicuity.

† Vide, for example, the case where a French bean was

As to the frequency of death, I have nothing to do but to offer to the reader the different data afforded by Dr. Marcet and Dr. Prout on the subject. The most favourable is the report of the Norwich Infirmary, where the successful difference is produced, probably, partly by the greater habit of operating of the accomplished surgeons of that excellent establishment, partly from the circumstance of many of the patients having the healthy strength of constitution, rustic life and its habits can alone impart. I may here observe that I have spoken with some well-informed surgeons, both at home and abroad, and have been told by them, that their experience had not been quite so favourable as in the examples afforded by the late lamented Dr. Marcet.

In the Bristol Infirmary the average number that have died is 1 in $4\frac{1}{4}$.

In Leed's Hospital, 1 in $7\frac{3}{5}$.

In Norwich Hospital, 1 in $11\frac{3}{4}$.

In Guy's Hospital, 1 in 7.

In La Charité, at Paris, 1 in 5 or 6.

withdrawn from the bladder, around which a calculous deposit had taken place. It is needless to inform the well-read reader that cases of stone having foreign bodies for nucleus are very common.

I have alluded above to the difference of result produced by an operation performed in the country, or on those who come recently from it, and one performed on those who have habitually inhaled the tainted air of the metropolitan towns. The reader, perhaps, knows that an immense difference as to result is also produced in operations, by the state of the mind of individuals ; so that operations performed on soldiers on the field of battle are infinitely more successful than those effected on the persons of mechanics in the London hospitals : principally, because the one individual looks confidently forwards to the secure retreat, the liberality of his grateful country offers him, and the other has to encounter the most doubtful and precarious existence when once discharged. Let us apply the data this affords to lithotomy, and we must conclude, that the terrors it inspires, must greatly increase the depression of the powers of life, which often ensues upon the long irritation of a difficult operation, and frequently closes the fatal scene.

All these evils will give way before the employment of gentler means ; sufferings and dangers, disappointments and terrors, all will fly at their approach ; and in those cases where the knife must resume its place, the surgeon will

find a healthier subject, and will meet with a more triumphant result. The benefit of the discovery of new instruments, susceptible of great improvement, and admirably combining together safety, certainty, and gentleness, can scarcely be estimated. Fearless of any accusation of wild enthusiasm, I have no hesitation to say, that if, as I trust, they are brought to accomplish all they promise, their discovery, in a humane point of view, will surpass that of the steam engine itself; since the latter can only minister to the luxuries and comforts of man, whilst the former will often save him from days and years of agony, as well as from the jaws of death.

There is more than one means by which the elimination of calculi can be effected, without creating such havock in the human body, as it was formerly thought must inevitably be made. If there are any persons who still think it right to advocate the frequent use of the knife, they will not, I should suppose, disapprove of milder measures when the operation should not absolutely be performed. Dr. Prout says he could not recommend it to a middle aged man, with a large family depending upon his exertions: other authors do not advise it when the patient is very old, with a weak diseased frame, &c. &c. Few

persons would perform lithotomy, where there would be reason to suppose the stone of such very voluminous proportions, as in the two cases already cited. In such cases, I think the patient may generally find relief and cure by the combined or separate use of the following means; as, for example—

By Chemical Means.

1°. By lithontriptics, or internal solvents of the stone.

2°. By solvents immediately applied to the stone.

By Mechanical Means.

3°. By dilatation of the urethra to that extent that a stone or stones may be withdrawn through it.

4°. By the forcible division of the stone into particles so small that the urethra will allow of their passage.

Under these four heads are contained all those new means due to the improvement of art. Some of these are limited in their powers of operation; some require the immediate improvements which

will proceed from practice ; and, lastly, another part has attained such a proportion of success, that should we never be able to push further our improvements, an event which is improbable, we should still be able, in most cases, to perform cures with not much more distress to the patient than if he were compelled to submit to the remedial means for a transient stricture of the urethra. The author has only to apprehend, that, lacking time and space, and distracted by professional and domestic business, he will not do justice to the subject ; and he offers the following rough sketches to his readers, hoping its deficiencies and errors will be obviated by their better information.

CHAPTER III.

ON CHEMICAL MEANS—AN ESTIMATE OF THE POWER OF LITHONTRIPTICS.

THERE is a point at which every solvent liquid will cease to take up any further quantity of any given salt, and when, a further quantity being added, a deposit takes place. Thus, when the salts of the urine become over-abundant, or some new principle is secreted, capable of forming, with the urinary alkalies or earths, soluble or insoluble combinations, crystalline or amorphous sediments are precipitated; or, again, if an enlarged prostate, a strictured urethra, impede its requisite egress, the urine decomposes itself, and those deposits take place in the blad-

der, which are seen so abundantly in all the common receptacles of this excretion. After this has taken place, if obstacles still present themselves to the discharge of these lateritious particles, they may become gradually agglomerated through the medium of the mucus of the urine, and the individual, in whom this has taken place, is afflicted with stone.

In healthy urine are discovered many ingredients, of which a few are found in the blood, and the remainder are peculiar to the secretion. As the stomach is the receptacle of that food and drink from which the urine is principally produced, on its digestive power depends, in some degree, the nature of this secretion; and when this is defective, new principles are again added to those ordinarily found in the urinary secretion. This is the great arcanum of diseases of the urine, and it is a pathological opinion which holds good, with very few exceptions; for if the stomach is not the primary source, it is still the primary agent in the concatenation of morbid causes.

It is in great measure through this influence of the stomach, as we have just said, that, in addition to those principles contained in healthy urine, such as the urea, the lithic, phosphoric,

lactic, sulphuric, muriatic, and fluoric acids ; the fixed alkalies, potash, soda, and the volatile alkali ; the earths, lime and magnesia ; as also water and mucus ; we find, in morbid urine, albumen, fibrin, the red particles of the blood, the nitric, erythric, purpuric, melanic, oxalic, benzoic, and carbonic acids, the xanthic and cystic oxides, Prussian blue, sugar, bile, and pus. These ingredients must of course multiply themselves again by the new forms they assume, and by their combinations, which we alluded to before.

We can notice but a few of the most important of these formations ; and the first important agent is the lithic acid, which is also always found in healthy urine, and when superabundant, subsides in crystals, or at other times appears in this state combined with ammonia ; the phosphoric acid, which, with the earths, lime and magnesia, to which ammonia is sometimes united, forms such distressing concretions ; and oxalic acid, which likewise meeting with lime, produced by the detritus of the bones, which it is the office of the urine to carry away, assumes in the kidney a hard substantial form ; the cystic and xanthic oxides, each of which forms stones, &c. &c.

It has been customary to look upon the production of stones as commanded by a certain diathesis taking possession of the frame ; and thus we have the phosphatic, oxalic, and lithic acid diatheses : and it is certain the constitution is, in most cases, deeply involved ; for, according to the diathesis, we see the body in a sthenic or asthenic state.

As the state of the stomach is found to bear a considerable share in the production of calculi, so much so, that a meal of animal food will greatly influence the chemical properties of the urine, it would have been, *a priori*, natural to have expected, that physicians should bestow no small attention, on the attempt of regenerating through the stomach, the evil it has had power to excite. To this then we owe the suggestion of the lithontriptical remedies, of which we are about to speak. They are medicines of which the older physicians conceived false and exaggerated hopes ; but which, however, even now, denuded of all illusion, are susceptible of effecting a great proportion of good.

Amongst lithontriptics, medicines are sometimes mentioned which do not properly belong to this class, such as *uva ursi*, &c. These we will dispose of at once, only observing, that by

their restoring tone to the stomach, and strength to the constitution, they often effect more than the real lithontriptics; for, from these beneficial changes, others in the urinary secretions immediately follow. With these remedies may be classed the narcotics, opium and hyosciamus, whose effects are most important: both possessing the requisite anodyne power, the former has, besides, a very great influence over the nature of the urine, and produces wonderful changes both in cases of diabetes and, occasionally, in calculous complaints; and it may be observed that it favours the secretion of lithic acid. We must now speak briefly of the remedies which more justly vindicate the title of lithontriptics; but to understand their effects, we must mention first a few of the characters of those morbid secretions they are intended to attack.

The three principal ingredients, from which all the other calculi are commonly formed, are the lithic acid, the oxalate of lime, and the phosphates; and still more to simplify our researches on the nature of the calculi, it happens that two or more of these substances are seldom found in the urine at the same time. There are then three acids which give origin, as we have before remarked, to the following calculi.

1. The lithic acid, which forms itself the most common calculus, unites also with ammonia, to create

The lithate of ammonia calculus, which is rare.

2. The phosphoric acid forms, by its combinations with the earths and ammonia, the most dangerous calculi, viz.

The phosphate of lime calculus, which is of very rare occurrence ;

The triple phosphate calculus, that which occurs so often in old men ;

The fusible calculus, which is a combination of the two former ; and

The prostatal porcelaneous, which is another form produced by the union of phosphoric acid and lime, &c.

3. The oxalic acid, the other important acid as concerns urinary concretions, produces

The oxalate of lime calculus.

The mixed, the alternating, the carbonate of lime, the cystic and xanthic oxide calculi, are all more or less of rare occurrence, and need not detain our attention.

The great object to be first attained, before the administration of lithontriptics, is, an acquaintance with the nature of the stone. And

here again we are greatly aided by knowing that it must be either of an acid or alkaline origin. The use of litmus or turmeric to test the urine, will speedily show which of these two chemical dispositions is prevalent. This mode, alone, of ascertaining the nature of the calculus, may not be sufficiently satisfactory, considering the changes that may take place in the secretions, and that if health is for one moment restored, lithic acid will be secreted again. There is another mode, which is open also to some similar objections; it is that of judging by the appearance of the urine, and by the deposits that take place in it.

In lithic acid calculus, the urine is generally of a reddish or pink colour, and deposits crystals on cooling.

In the phosphatic diathesis, the urine is of the colour of whey, and deposits a white sediment. On the contrary, in the oxalate of lime diathesis, the urine appears of a natural light yellow, and is acid.

Though a *whitish* sediment betokens the presence of the phosphates, when it is remarkably white it is a sign of the lithic diathesis. Such a deposit, consisting of lithate of soda, is very rare.

The amorphous or crystallized nature of the

sediment in calculous urine, as well as its specific gravity, may assist our discrimination.

The observation of the state of the constitution facilitates our distinction of different species of stone; for in the phosphatic diathesis its strength and tone are lost; in the lithic acid diathesis there is an opposite tendency to fever and inflammation; and in the oxalate of lime diathesis there is often no disturbance of the constitution, but such as the symptoms of the stone may occasionally give rise to.

To have more precise means of judging of the nature of the stone present in the bladder, is a great desideratum. This Fourcroy proposed to accomplish by injecting a weak alkaline or acid solution into the bladder, which, being examined, after having been allowed to remain there a sufficient time, would, by the combination it had formed, impart to the physician a knowledge of the stone's composition. This object may be more certainly effected by introducing, through an open-ended silver tube, a stilet ended by a small fine rasp; by which means particles of stone may be easily obtained. I shall have again an opportunity of mentioning this instrument, and shall then point out an instance of its use.

Knowledge being once obtained of the cha-

racter of the stone, nothing remains to do but to administer the appropriate lithontriptics. We shall but just advert to these, together with those other medicines that keep the patient in a state favourable to their action.

In the lithic acid diathesis, magnesia, the subcarbonates of potash, and, above all, of soda, or soda dissolved in water charged with carbonic acid, doses of Rochelle salts, which refresh the body and clear the bowels, at the same time as they act chemically, are the principal medicines to be recommended. Anodynes may be required; and hyosciamus combined with uva ursi, where the stomach wants energy, appears the preferable narcotic. Opium has a tendency to excite secretion of acid, and, when employed, had better be administered combined with soap and alkalies. Diet* is particularly to be attended to; since the indulgence in large meals, above all of animal food, augments the lithic acid in the urine.

The oxalate of lime diathesis may be com-

* The diet of patients cannot be too much attended to; since not only we see it operate so many changes in patients, but to the difference of habits in this respect has been attributed the frequency and nature of the calculous diseases in the different provinces of England.

bated, like the former, by alkalies ; medicines which, even when contra indicated, produce a very great effect in reducing the local irritation of the bladder. Dr. Prout has advocated the use of the muriatic and vegetable acids in this form of calculous disease ; and we must refer to his ingenious arguments for explanations of his reasons*. Here again care must be taken to lull the patient's sufferings with anodynes, and to regulate his diet and exercise.

To antagonize the phosphatic diathesis, and to dissolve, if possible, the stone that is formed by it, the muriatic and sulphuric acids, and, when the patient's stomach cannot endure these, the carbonic acid, have been beneficially administered ; as well as the citric acid by many physicians. To favour the effect of these, the acidulous wines of France and Germany, as also such acid beverage as cider, perry, &c. are recommended. The patient labouring under the phosphatic diathesis, requires generally a great deal of artificial support ; and tonics and bitters must frequently be administered, and he must also occasionally eat animal food at his repasts. Opiates will be

* Vide Dr. Prout's work, p. 160.

often required here, and must be given in frequent and very considerable doses to make the desired impression. What must be avoided most, are stimulant diuretics and large doses of calomel. Strong purgatives do often much good, and make some impression upon the stone; but as, by directing a greater flow of blood downwards, they increase the patient's distress, they must be employed with discrimination. When the disease has originally proceeded from injury of the back, blisters and setons may be advantageously applied to the part.

Most of the other calculi that do not belong to the different heads enumerated above, are equally soluble by acids and alkalies. In the fibrinous and albuminous calculi, as well as in all generally, water as a drink, a most important agent, may be employed; but as we shall advert to it presently, we will now avoid further mention of it.

Lithontriptics, though seldom if ever possessing the power of dissolving completely stones in the bladder, may certainly be made to command the diathesis in which they were secreted, and are even capable of changing it to one of an opposite character: an evil, indeed, which I should have mentioned as sedulously to be avoided, unless

when it is intended as a remedial means in the treatment of concretions of oxalate of lime.

Should we refuse our confidence to the instances that have been given by older authors of solution of stones by lithontriptics, we have undeniable testimony of their texture having been attacked, and of calculous scales having come away through the urethra, both during the use of acid and of alkaline medicines*. If by lithontriptics the patient's sufferings may be removed, and he may enjoy life with no further distress than transient moments of anxiety at the future evil that may occur, much already will be effected. We know that a stone may remain sometimes for years in the bladder, under favourable circumstances, without pain being felt from it; and of this we have many examples, and particularly that of the clergyman, in whom Morand ascertained by the catheter the presence of a stone. The patient would never believe it from the absence of pain, and having bequeathed his body to this eminent surgeon, a calculus was found in his bladder on dissection. The surface of the stone is rendered softer by lithontriptics, as well

* Vide Marcet, p. 159, & sequent.

as diminished in size ; and Dr. Marcet mentions a case where, during ten years, a highly sensitive individual derived comfort and relief from the administration of an alkaline lixivium. As an *adjuvant* to other means, when only the most dangerous methods of cure could otherwise be employed, or when a case presents itself so unfavourable as to admit of scarcely any other means, the lithontriptics may justly vindicate a share of our notice*. It is the new discovery of safe and gentle, though active means, which contracts so much the field of their utility.

I have said many things in this chapter which are equally applicable to the next, and which I shall therefore not repeat. As to what relates to the chemical composition of calculi, I regret it is not written by a more finished chemist ; but the works of Henry and Brande, of Marcet and Prout, are within every body's reach, and may amply compensate for my deficiencies.

* Since my first writing the above pages, I have had an unexpected proof of the power of lithontriptics, in a case where a patient, labouring under enlarged prostate and phosphatic calculus, after taking infusion of buchu and mineral acids, has voided a quantity of white mud ; and his stone, formerly felt by myself and another surgeon, can no longer be reached with the sound. The patient's sufferings are much abated.

CHAPTER IV.

ON THE USE OF SOLVENTS.

ONE must be persuaded that that impatience which is one of the great characteristics of men as individuals, does not exert less influence upon them in the mass, not to feel surprised that the present means of dissolving the stone has not reached of late years the most beneficial degree of perfection, or has not been proved on better grounds to be undeserving of pursuit: and this is still more extraordinary, as, on the one hand, lithotomy was much worse than decimating calculous patients, and, on the other, chemistry was pushed to such a degree of perfection, that scarcely any thing could resist the crucible of enquiry. The most famous chemists of the time of Boerhaave had not sufficient knowledge to effect their wishes; and this has been for a long time an insuperable obstacle to employment of this method, an obstacle which is now removed. It

must also be acknowledged that many strong objections have been urged against the solution of stone in the bladder; but in singling out even those that have been presented to us by one of the best chemists and most elegant writers of our day, it does not appear to me that they have any validity, considering our present means. The bladder, like the stomach, has its vitality, which resists, to a certain degree, the action of acids and alkalies, though perhaps not so much as the former viscus. It is allowed by the opponents of the method, that we can crumble down the phosphatic envelope of a calculus. In such a case, then, the nucleus of lithic acid or oxalate of lime alone will be left, and with facility can be taken out by our forceps, if it is not voided with the urine, as renal and other calculi so often are. Dr. Marcet introduced into the bladder a solvent consisting of twenty-three drops of muriatic acid in four ounces of water, and it produced relief in the patient, and no unpleasant symptom. This solvent was more powerful than necessary; and we possess an instrument by means of which, we can establish a continuous flow of a weak solvent in the bladder; and what seems also certain, we may use a fluid, which, though possessing no acrimony, and only slightly impregnated at

the same time with some anodyne, to sooth the bladder, will affect the texture of the stone.

It may likewise be remarked, that there is no reason to think that a concentration of lithic acid in the urine, or a strong ammoniacal state of this secretion, when vitiated, may not cause infinitely more irritation than a solvent of more than twice the strength of that it will be necessary to employ. The cause of the little success of former injections of solvents for the stone, was that they were few and far between, and could therefore have no continuity of effect; and that they were either so strong as to injure the bladder, or so weak, that being but seldom applied, they could produce no effect.

Each description of stone has a solvent; and indeed a very few solvents, comparatively, are sufficient to dissolve all the stones we are acquainted with.

The lithic acid calculus, and lithate of ammonia, are susceptible of being dissolved by caustic potash, by lime water, and nitric acid. As far as the imperfect mode of applying the solvent could be expected to effect it, lime water had long ago been brought forward, as having produced great benefit by its application to stone in the bladder. In the year 1754, a Scotch surgeon

related favourable results of its trial; and Dr. Egan and Dr. Murray have since added their testimony, and attributed much of its power to its effect upon the mucus and albumen which cement the stone. Nitric acid, in very weak solution, might be more powerful; but it still remains to be tried, as well as the more certain effect of a solution of the fixed alkali. It appears that the Arabs attempted to cure the stone by an injection of an alkaline ley into the bladder through a gold catheter*, and it is said with success. Oxalate of lime is acted upon by the mineral acids. It is the substance that resists most; but, on the other hand, it is in general of so small a size when first it comes from the kidney, that, when not voided with the urine, it may in many cases be seized and brought away by any of the new forceps, as I mentioned before.

The phosphate of lime, the triple phosphate, and fusible calculi, dissolve readily, above all the latter, in dilute acids. They are the calculi which those who think solvents inapplicable, allow are dissolved at least as far as their nucleus,

* Vide Edinburgh Medical Commentaries, 5th vol.; and Mr. J. Arnott's second publication on the Dilator, p. 82.

which is in general of lithic character. We have explained how this nucleus may be removed, should it not be of a size to require to be further reduced. That the nucleus is very small, every surgeon knows, who has been in the habit of seeing human calculi ; and those who may wish to refresh their memories on this subject, may consult the plates of Dr. Marcet's Treatise on Calculous Disorders.

The solution of alternating and mixed calculi, which are comparatively very rare, must require the most sedulous attention on the part of the surgeon. The state of the urine would indicate the nature of their first laminæ ; and much more surely, the little file we formerly alluded to. Muriatic acid might answer the purpose of dissolving these heterogeneous bodies (which, from this very character, would probably present less resistance to solvents) ; for the strong mineral acids not only attack successfully the phosphates, but have the power of disengaging from their links the weaker acids.

We will not enumerate the solvents of the other calculi at present known to us. Suffice it to say, that both acids and alkalies dissolve those more unfrequent productions of disease in the urinary organs.

We have already given some insight into the means, by which the nature of the calculus with which the patient is afflicted may be recognized. I have given a plate of an instrument similar to that by which Mr. J. Arnott has proposed our obtaining a correct notion of the nature of the stone; and it must appear indeed to every one, fully capable of answering this important purpose.

We have also adverted to the necessity, to ensure the full success of solvents in disease of the stone, of being able to act upon the latter rather by their quantity and continuity of application, than by the intensity of their chemical powers. There is one solvent we have scarcely mentioned, which appears to possess these necessary qualifications in an eminent degree. This is water. Water has solvent powers, when thrown into the bladder, which are entirely independent of the substance it may bear in solution. At its common cold temperature, it dissolves the lithic acid in small proportions; and when raised to a higher grade, its power must increase. Its effect on the lithic acid I mention first, because it is the substance against which we seek for most means of attack. To the other chemical powers it may possess over the calculi, it adds the important

quality of affecting those animal substances which are the media through which calculous particles are in great part brought and kept in contact. The vesical mucus does not immediately dissolve in it; but it absorbs water and becomes glairy, and thereby may be put into a state to be eliminated from the bladder. The albumen in the stone, and the fibrine concretions themselves, are softened by it. The pus it carries away in its current, and it may probably attack successfully the stones formed of pus, which Raw has "proved by experiment to exist." Dr. Darwin, it is well known, imagined that stone was principally created by increased absorption of fluid particles, hardening the mucus, mixed with sabulous matter, which is so abundantly secreted in calculous diseases. Such may be occasionally the source of stone, and renders still more important the agency of water.

To derive advantage from so weak a solvent as the above, it was necessary it should be applied in a continuous current; and this is done by the double catheter, or *sonde à double courant*, as the French surgeons expressively call it. This instrument is formed by two catheters of silver, or of caoutchouc, placed within one another, and which have each a separate entrance and a

terminating orifice. With each of these tubes another tube of gum elastic also is connected ; one communicates with a reservoir, from which water, at a proper temperature, is conveyed into the bladder, and the other tube is a sort of waste pipe, conveying away the water from the bladder to a convenient receptacle. The current of water may be regulated in its quantity, and the rapidity of its flow, by more or less incurvating the caoutchouc tubes. To give a better idea of this, I have annexed a representation of it at the end of this Essay.

This salutary invention seemed to have been first thought of many years ago by an English physician, from whom Deschamps took the idea ; but it was totally lost and forgotten, when, a few years ago, Dr. Arnott suggested it to his brother, who has enrolled it amongst his many valuable discoveries, in his second work on the dilator. Lately, when I went to Paris to investigate the use of the lithonriptor, I had the pleasure of being introduced to Mr. J. Cloquet, who, amongst many things worthy of attention, in his surgical ward, showed me an elderly individual, on whom he was trying the use of the *sonde à double courant*, as a means of establishing a current of water, which is kept between 26° and 32°

Reaumer, and in whom it seemed to produce much benefit. As the above gentleman is earnestly engaged in trying the effect of water, thus made to act continuously upon calculi in the bladder, we may soon expect very interesting data on the subject. Its soothing effect upon the bladder, when either water*, or a dilute solution of extract of poppy or opium is injected, the English inventor had already ascertained, at the time he proposed its use in calculous diseases. As to its application in the latter cases, it may be said to impart to us every facility by which to apply the solvents without risk of evil, and with a continuous and decided influence. This is done without any great inconvenience to the patient; since, if he does not submit to its use during the day, at night it may be employed during his sleep.

In calculus of the bladder a ropy mucus is secreted, which helps to increase the stone, or to borrow an expression from a professed writer on the subject, which, after being the consequence,

* We have a remarkable example of the power of water, thus continuously injected, in curing disease, in the case Mr. S. Cooper cites, in his First Lines, of an actress cured of cancer of the womb.—Vide the Art. Cancer, in the said work.

becomes a concurrent cause of stone. This the solvent current will remove, as well as every deposit or precipitate caused by the chemical fluid. It is thought that the coats of the bladder itself often produce, when diseased, the phosphatic calculary substance; and we are certain that in the prostate, peculiar hard porcelaneous calculi are formed, by its acting upon the urine in its morbid state. The use of a proper current from the *sonde à double courant* will prevent these dangerous formations*. When a weak acid solution is carried into the bladder, it will check the secretion of the ropy mucus; and a current of fluid will be particularly required when alkalies are used internally for combining with the phosphoric acid, they precipitate the mucus the former holds in solution, and mischief might arise from its accumulation.

Much remains to be done towards the improvement of this branch of the treatment of calculous diseases. If further experiments prove it to be susceptible of such effects, as one would

* The effect a current of fluid may have on stones, by its mere continued impetus, is proved by examples of large stones being found perforated through their centre, to allow a channel for the urine to be voided.

suppose it capable of with our present knowledge, its ministry may be rendered highly beneficial. When the stone is so very large as to refuse to come within the grasp of an instrument, or to be safely brought through an incision; when the urethra is diseased; when the patient is exceedingly irritable, or apprehensive, &c. a small double elastic catheter may be introduced, in connexion with the remainder of the apparatus, and the stone may be reduced to a size to be grasped by the forceps; the urethra may be rendered less susceptible by being made no longer the channel for the morbid urine, at the same time as the important object is effected, &c. &c. The lithontriptics may be simultaneously brought to bear on the constitution, whilst every dyspeptic symptom, or other concurrent disorder, is palliated or removed.

Cases have occurred, where the calculus literally adhered, in the greater part of its surface, to the mucous membrane of the bladder. Few English surgeons would run the risk of tearing forcibly the stone from the bladder, as done in one case by Le Dran, when the rugged surface of the stone remained covered with the membrane, and the patient *recovered*. In such cases solvents might be employed with great benefit.

The first proposer of the dilator has mentioned an instrument, by which the stone might be enclosed in a bag, in the bladder, and very strong solvents applied. This gentleman however, being called away to other duties, has not yet tried, I believe, the instrument in question. I have myself been occupied in the designing of an apparatus, suggested by the mechanism of the lithontriptor ; but, in the crude state of my plan, I shall not trespass upon the reader's time by any description.

CHAPTER V.

ON MECHANICAL MEANS—ON DILATATION.

As we proceed in unravelling the thread of our subject, we arrive at the consideration of resources of art, which possess more and more of certainty and precision in their operation. We now step forward to explain one of the means by which a stone may be taken entire from the bladder, and which, in one sex at least, must dispute the superiority with every other mode of extraction. From the improvements of which this method showed itself susceptible, may be derived the conception of those ideas and hopes which have led us to the possession of means which embrace in their operation, every case of calculus in the bladder, with comparatively few exceptions. The notion of dilating the urethra, so as to allow of the passage of a calculus, was long ago entertained. Prosper Alpini, a distinguished professor of botany at Bologna, in the

beginning of the seventeenth century, relates a mode which the Arabs successfully employed he says, to extirpate the stone. This consisted in the introduction of a tube into the urethra, by means of which they distended with air from the mouth, both the bladder and its outward channel of communication, so as to allow of the passage of the calculus; the air was then suddenly allowed to rush out, and with it the calculus*. This mode of operating seems to have been adopted in the male, and we are rather at a loss to account for its success. It is in the female that all means acting by dilatation are most applicable. The female urethra is short and membranous, and not being enclosed in a body so resisting as the prostate, allows of very great expansion; and this is the reason why females are less subject than men to the stone. As however their urinary organs are not such complicated apparatuses as those of the male, and their urethra does not perform a double office, whose

* The calculus was thus lodged in the urethra, from which it was withdrawn by *suction*, by pressure, or by the use of appropriate instruments. Alpini says he saw three individuals cured by such means. This report has been corroborated since by Roveretti.

abuse leads to so much disease ; their bladder also seems to be less irritable, from the absence of painful sympathy, and calculi occasionally forming in the bladder, or coming down from the kidney, though most frequently voided soon after, may more easily remain within unnoticed, till their size is considerable, and imparts exceeding pain. The shortness of the female urethra is also a reason why stone frequently forms, in the bladder around bodies which find an easy access. Whether introduced intentionally or by accident, almost every description of small foreign bodies has been found in the bladder of the female, from a pin or a needle, to a toothpick or a small apple. Surgeons formerly used a peculiar forceps, of which a plate will be found in this volume, by whose dilating power the female urethra was sufficiently opened to admit of the extraction of the stone. This singular instrument, though ingenious in its construction, not being sufficiently rounded on it's edges, and requiring a force to be applied to it, which was sudden and not regulated, was soon dropped. To this succeeded an operation, in which dilations and incisions were combined, which, of course, being very faulty, was supplanted by an instrument invented by Louis, which, like

the new cystotome of Dupuytren, cut on both sides on a spring being made to act. The high operation was recommended in lieu of the operation of Louis, from the inconveniences it still presented; and of late years, in England, a simpler incision has been resorted to, when ministry of the knife has been employed.

Though less hazardous in the female, lithotomy, considering how seldom it is resorted to, has certainly, even to my knowledge, sent its proportion of patients to the grave; its least disadvantage is incontinence of urine following it.

Dilatation, never totally abandoned, was again resorted to with more assiduity; and Bromfield extracted a stone from a young female by introducing into her urethra the blind gut of an animal, and by afterwards filling it with a fluid, which produced the requisite dilatation. This was an isolated case, and the gentian root, &c. were again used to dilate the female urethra. Latterly, bougies made of dried sponge were the principal means we relied on. These were also objectionable, from the slowness of their operation, and from their obstructing the passage of the urine during the treatment, &c. &c.

Six years ago, Mr. J. Arnott brought forward his dilator, which, besides its other admirable

susceptibilities of application to stricture of the urethra and rectum, &c. allowed of its being applied with success to the present object. Under the eye of Sir Astley Cooper it was proved to be susceptible of still more, since, by its means, a calculus was extracted from the bladder of a gentleman, whom the operation of lithotomy had failed of curing of the stone. This instrument has a gentle equable effect in dilating the urethra, and may be used either when the object is to be effected at once, by the use of a large dilator, or successively increased sizes of the instrument may be employed, when slower dilatation is judged advisable. In referring to the plate, No. 1, a representation of this instrument will be found; and it will be seen, that for this purpose it consists of a small catheter, surrounded by a tube composed of silk and animal gut, to render it both strong and air-tight, and that it is filled from a gum bottle, whose tube communicates with the distensible gut. Thus the urine may flow through the central channel, whilst the tube that surrounds it distends the urethra. It would be needless to dilate on the advantages of this contrivance, which are evident; but we may mention the one, of inspiring no apprehension in the minds of timid females.

Mr. Weiss, the surgical instrument maker, at the suggestion of Sir A. Cooper, has been ingenious enough to construct a dilator, by means of which the female urethra may be speedily dilated to the necessary calibre for removal of the stone. With this instrument Sir Astley Cooper first extracted a stone from a patient of Dr. Nutall, and subsequently was fortunate enough to remove a bougie, which had broken in the bladder of a lady at Bromley*. Messrs. Brodie, Green, Phillips, and Dr. Ramsay, have met with equal success in the employment of this dilator. The stones extracted were most of them of considerable dimensions; and one, above all, extracted by Dr. Ramsay, measured two inches in length by three-eighths in breadth, and one in thickness. It is difficult to decide, from reading these cases, whether the dilatation should be effected immediately, or should be performed gradually. Sir Astley Cooper recommends that the dilatation should be immediately effected in cases of small stones, but that it should be slow when larger exist. In all these cases, however, it was performed comparatively quickly, and it

* Vide Medico-Chirurg. Transactions, vol. xii. part i.

left behind only an incontinence of urine of a month's duration at most ; and a little irritative fever was produced. Since the employment of the first instrument of Mr. Weiss in the above cases, the advantage of an instrument that would open in a straight line, and whose blades would be parallel when most separated, has been suggested. The instrument thus improved has been constructed by this clever mechanist, and has been used successfully by Mr. Chandler, of the Kent Hospital. In plate 10 I have given a representation of its form and construction, in which it will be observed how easily it may be dilated by turning the handle. It has some defects as well as advantages, when compared to its successful prototype ; and this appears to me to be, that each blade has not quite enough roundness and breadth, and therefore acts too much on one part, and in one direction ; and I observe that the same idea first occurred to Mr. Chandler, who wishes the instrument had another limb. This inconvenience is easily remedied, and in the mean time the other form of Mr. Weiss's instrument may be employed by those who are of this opinion.

Where there is a peculiarity of construction of the urethra, where it is callous and diseased,

or when the patient is of so irritable a temperament that fever may be apprehended, I should recommend the use of Mr. Civiale's instrument for crushing the stone. And I am further persuaded to do so ; first, because, in several of the cases mentioned above, the stone was broken by the forceps ; and, secondly, because in this way there would be no possibility of incontinence of urine following the operation of the instrument ; a consideration of great importance to those who know what an exceedingly distressing affliction it is to the females to whom it occurs.

We have mentioned dilatation for the extraction of the stone in men, and cases may present themselves, in which it will be of the greatest use. Indeed, in conjunction with other means, it must always be employed in a narrow urethra ; as also, frequently, when a small stone must be extracted entire through that channel. On this head we will say no more, as it would only anticipate on the important subject which it now remains for us to offer to our readers, whose patience and indulgence we must request for a few moments more.

CHAPTER VI.

ON THE BREAKING AND BORING OF STONES IN THE BLADDER.

THERE is nothing more remarkable in many of the greatest discoveries that have been made in every branch of human knowledge, than the simplicity of those circumstances on which these new inventions seem to have depended. This explains why so many persons vindicate their right to a first conception, and why we all read in authors of suggestions, which have remained unaccomplished, but which just balanced a moment on the verge of a great discovery before they were given to the world, to be looked upon as visionary speculations. Some ages since, a monk, a man of that order, to whom we must confess we owe the greatest discoveries in lithotomy, as well as the preservation of learning during the darker ages, contrived a mode of attack-

ing the stone in the bladder by the means of a small chisel*. We do not possess any exact account of this process; and between this isolated instance and one that is so well known, that of Colonel Martin, we do not know of any case in which any means has been adopted for breaking the stone, without the operation of cutting instruments. Colonel Martin, by the means of an incurvated instrument, like a large stilet, having its extremity dilated and turned into a delicate file on its convexity, attacked the substance of a stone by which he was inconvenienced, and success rewarded his ingenuity. No surgeon would dare to employ such an instrument as it then was: it required a determination in the patient to do it himself; and even with this qualification, and great dexterity on his part, we must feel astonished that the pulverization of the stone could be accomplished without great injury and irrita-

* This individual was a monk of Citeaux, in France. He used to give his stones sudden, though slight, blows with a little hammer, applied to the end of his chisel, introduced into the bladder. He used also to show to the curious a little box, full of particles of stone he had thus brought away. This story, perhaps fabulous, is taken notice of in Baron Percy's Report to the Academy on his examination of the lithonriptor.

tion of the softer parts. I have spoken elsewhere of a file, suggested by Mr. J. Arnott, to bring away some portion of calculi from the bladder, in order to ascertain their nature. As this gentleman has not given any representation of this instrument, I have offered a sketch of Colonel Martin's curved file, and I have represented it as surrounded by an envelope of India rubber, to prevent its filing the silver canula through which it is to be introduced. Above the file, at the extremity of the instrument, there is also a metallic ball, with which, I have imagined, to fill up the open end of the curved catheter during its introduction. The catheter is marked at nine inches, to point out approximatively its having entered the bladder. The stilet is also graduated, to mark when the file has cleared the extreme end of the canula. Such is the instrument I propose to employ, and such as I have designed it in the absence of Mr. J. Arnott, who is enjoying, in a distant region, the well-earned reward of his talents. With an apology for this digression, we return to our immediate subject.

Colonel Martin's success awakened the vivid imagination of Darwin ; and we may perhaps be excused, if we quote here one of his effusions of inspiration. " If the urethra, by frequent trials,

should become so insensible as to admit easily the frequent introduction of a metallic canula, might not two fine steel wires, properly tempered, be joined at one end by a hinge, and thus be introduced through the canula into the bladder; and when protruded beyond the extremity of the canula, they might open by their elasticity so as to receive the stone, and confine it against the end of the canula by retracting them? The proper direction of the wire springs, so as to open when they are pushed through the canula, must be previously given them. If this could be managed, a small file or borer might at the same time be introduced through the canula, the handles of which might consist of joints to permit them to bend in all directions, and thus the stone might be broken to pieces by a few trials; or if it was a soft or fragile stone, the retraction of the wire bow might divide it at every trial, till it became almost reduced to powder." At the present time, I do not think it would be at all difficult to construct such an instrument as Dr. Darwin imagined; and the stone might be caught with the wire (the patient standing) in the same way as we see boys draw corks out of bottles with the noose of a string. Once so confined, it would be most easy to make the due impression on the stone.

Dr. Darwin's idea was dropped ; but it may be remembered to his great honor ; and in this occasion, as in many others, we see, and shall continue to see, accomplished many of the prophetic conceptions of this scientific and poetical character. Desault also thought of placing a forceps at the end of a catheter ; and John Hunter approached still nearer to our present instrument, in the design of his forceps, which we retain in use. I may be spared the trouble of enumerating many approximations of the same kind. Suffice it to say, that all failed, for want of the knowledge of a fact which I look upon as the most valuable by far of those brought to light by Dr. Civiale. This is the discovery that a straight instrument, even of considerable volume, can in ordinary circumstances be introduced with ease into the bladder. How the great men who have investigated the structure, dimensions, shape, length, and every minute characteristic of the urethra, never stumbled upon this important fact, I leave to the ingenuity of others to explain ; for it totally baffles my attempts at solution. This is so much the more extraordinary, as, in past ages, straight sounds were known and employed. In the ruins of those towns, which, together with the admirable Pliny, were destroyed in the year 79 of our

æra, such instruments have been discovered, in the surgeries of those who then professed our art. For Dr. Civiale this fortunate discovery was reserved. It is said that he derived some information on the subject from some speculations in a foreign paper; and two men of talent in France assert having had, at the same time, the same idea. But of this we know nothing certain, and care still less; and as to any other detractors of this discovery, we are steeled against their attack, by remembering the too correct sentence of the poet, that

Envy will merit, as its shade, pursue.

We render a due tribute to Dr. Civiale's talents, and we think the lithonriptor can stand scrutiny and criticism; though it is probable that by degrees the latter will suggest minute changes and more numerous modifications of the instrument, which will render its use still more extended and precise than it is now, if possible. It is another reason that makes me feel a sincere pleasure in offering it to the examination of our surgical brethren throughout the kingdom, as it may elicit from them observations and improvements of importance. We shall have, shortly, to

describe those excellent modifications of the instrument which we owe to Mr. Weiss's ingenuity.

Begging our readers to place before them the lithographic sketch of Mr. Civiale's instrument, we will describe its construction as rapidly as possible. The lithontriptor consists of an outward metallic straight tube, varying in size according to circumstances, and measuring from ten to twelve inches long; within this is another tube, three inches longer, more or less, and terminating in three elastic self-expanding prongs, being, at their greatest expansion, at not quite one inch and a half distance from each other; they are incurvated at their extremity, to avoid wounding the bladder, and to keep firm hold of the stone, for which purpose they are also a little rough internally, though not at their edges. Innermost of all, is a long rod, in a slight degree longer than the second tube, and having an extremity at one time much like a lemon scoop, and at other times like an old trepan, or of any other appropriate form. The inner or forceps tube may be protruded at pleasure as far as three inches beyond the outer tube, and, when there, may be fixed in this situation, by a screw at the outward extremity of the latter portion of the

instrument. The greatest expansion is given to the forceps by retracting the saw rod as much as possible, and it may be fixed in any situation by a screw at the end of the inner tube, similar, though smaller, to that described in the outer tube. When the stone is placed within the fangs of the forceps, the saw is pushed a little forwards, and the forceps tube is drawn back, so as to close and press upon the calculus, and it is fixed by the screw in the outer tube. Now is the time for the saw to be put in action, and this either by means of a bow, or of a winch applied to its outer extremity. As the saw proceeds in its work of crushing the stone, the forceps is to be more and more retracted back, till, with the saw, it reaches its situation as before its introduction. It is then brought out of the bladder, and its employment ceases for the moment. I have given a representation of the instrument when the saw and forceps are nearly as much retracted backwards as possible. This is effected by bringing these two portions of the instrument nearly on a level at their extremities towards the bladder, and then drawing them *home*. Thus retracted, the extremity is smooth, though slightly conical, and it is in this state it is first introduced and withdrawn, when a small stone does not happen to be engaged in the forceps above the saw.

The first instrument employed by Mr. Civiale was made of steel, and had a winch screwed to the end of the rod at whose other extremity the saw or borer is. Since then Mr. Civiale has improved his instrument, and makes use of a bow to put the borer in motion; the extremity of the borer's rod being first put in connexion with a watchmaker's lath. I have given a representation of the first instrument, as it is now still made by Carter, an English instrument-maker in Paris; but an improved instrument is also represented in the same plate. In this I have figured what improvements I have observed in the lithontriptor M. Civiale had the kindness to put into my hands for inspection, during my stay in Paris, and have perhaps added some trifling notions of my own to its improvement. The first instrument, formerly employed by M. Civiale, has several defects; and I mention this particularly because I have seen it here in the hands of a friend, who found fault with the lithontriptor on that account. That which this gentleman had, was moreover exceedingly narrow in the expansion of its forceps. In the first instrument, the long screw for the reception of the winch is inconvenient, in moving in and out the saw, and the winch might rise so high as to prevent the saw being pushed

out, so as to come nearly on a level with the extremity of the forceps. In the first instrument there was no button that might be affixed to the end of the borer, by means of which direct pressure might be made upon the stone; a pressure which, in many first cases, and in subsequent operations, is frequently sufficient, without the employment of any other agent than the hand. As to the use of the winch, which M. Civiale has since abandoned, I consider it more recommendable than the bow, and I believe the ingenious inventor is come round nearly to the same opinion. It does not require a motion that shakes the patient so much, and the lithonriptor may be held firmly with one hand, whilst the other turns the winch.

Looking at the sketch of the improved instrument, it will be seen that the outer tube is made of silver, to prevent its rusting, and that there is a rim of gold at the end to resist the effect of the protrusion and retraction of the forceps; the borer is graduated, by which you may learn the presence of the stone in the fangs of the forceps, and approximatively the size of the stone; the forceps' tube has also a mark or two at its external extremity, which teaches when it is quite home to its place, and prevents your attempting

to withdraw it whilst the portion of stone is still too large to allow of it. There is a nut or button to the instrument, for the reason before mentioned. This additional portion may be unscrewed, and a winch may be applied which cannot screw too far up. The surplus of length of the borer's rod is exactly calculated, so that it cannot be pushed beyond the forceps, &c. &c.

We are sorry to trouble our readers with such dry details, in which it has been necessary to use descriptive or *ad hoc* expressions which do not tally much with received ideas of euphony. It was absolutely necessary, however, to give these details; and after all, what we most fear, is, that they may not be sufficiently precise.

With the above instrument I have seen Mr. Civiale operate even on a man debilitated by years and disease, with great success. This individual came on foot to Mr. Civiale's house, supported on the arm of a servant. He placed him in a reclining posture on a sofa that had been put on a table for the occasion. A cushion raised his pelvis; another supported his head and shoulders. Mr. Civiale injected his bladder with warm water, introduced with the greatest ease a three-line lithonriptor, broke the stone, and brought out the lithonriptor thrice; once

with a portion of stone as big as a French bean, next with powdered calculus, and the last time with mixed sand and mucus. The bladder was cleared with an injection of water, and the patient walked home with his servant, receiving previously a recommendation to use the warm bath.

The bringing forward this new discovery to its present point, has been the work of nearly six years; and one might almost say of as many centuries. It has met with success; for which, independent of my own observations and testimony, I refer to the Report of the Academy of Paris, and to the cases of Mr. Civiale, at the end of this volume. It is every day gaining new powers, from the improvements in mechanism, a branch of art that is greatly flourishing in our times. Such a discovery merits our serious attention; and in the few following pages I hope to offer many necessary details, amongst which some improvements of my own are interspersed.

CHAPTER VI.—SECTION I.

OF SOUNDING, AND THE USE OF A LITHONTRIP- TOR AS A SOUND.

PAIN in the hypogastric region, at the bottom of the scrotum ; above all, a burning sensation at the extremity of the glans, and itching of the genital parts of the symphysis ; frequent efforts to make water, which as frequently suddenly stops in its flow ; the appearance of sand, blood, mucus, pus, in the urine ; a sense of weight and bearing down in the rectum ; all these symptoms, collectively, indicate the presence of stone. These appearances are, however, any thing but decidedly diagnostic ; and the presence of stone can only be established by its collision with an instrument.

The steel sound is expressly constructed for ascertaining the existence of stone in the bladder ; but I confess I have often been foiled with it, whilst I have more certainly succeeded by using the silver, and yet more the elastic catheter, as, I believe, Sir E. Home recommended long since.

By letting the urine flow, in withdrawing the stilet, the stone more certainly comes in contact with the instrument, and betrays its presence.

The qualities of the stone may be learnt approximately in sounding. It is large when we encounter it at every movement of the instrument; it is small when we soon lose its collision, and find it again with difficulty; it is soft when its collision with the instrument emits a dead sound; it is rough when it communicates to the hand a gritty feel, &c. &c. To assist us in our *exploration*, we may introduce our finger per rectum, and thereby acquire, often, very useful and decided information.

The sound, and other instruments mentioned above, stretch across the bladder, whilst the stone frequently retrenches itself in a hollow behind the neck of this viscus, and the only motion that can be given to the instrument is a little impulse downwards, or from side to side, which will often not encounter the stone. Calculi have been also, though rarely, found in the bladder, so covered with a thick mucus or albumen, or so entirely formed of fibrine, as totally to elude our power of distinguishing it. On the other hand, an induration of the prostate, or some other circumstance in the state of the lower part of the

urinary organs, has occasionally led surgeons into a false persuasion of the existence of a stone that never existed. Thus Desault, one of the first surgeons of his age, together with several of his colleagues, persuaded himself of the presence of a stone in a boy, who being operated upon, none was found, and the lad fell a victim to the best of intentions and of operators.

A three lines' breadth lithonriptor, used as a sound, presents all the requisites necessary to encounter all the difficulties above-mentioned: at least, this has struck me most forcibly since I brought the instrument to England, and I trust others will concur in my opinion: M. Civiale mentions, in one of his cases, his having found the lithonriptor an excellent sound, though he does not say why; nor did it occur to me to ask, during my hurried stay in Paris.

Let then the operator, when he wishes to sound, only put the forceps tube within the outer one, and withdrawing it into its place, stop up the outlet towards him. When introduced, as presently will be described, let him push forward the inner tube, and the extended forceps will spread in three directions, and one of its blades will dip behind the neck of the bladder. The instrument, thus expanded, will allow of every mo-

tion of the sound, and, besides, it will admit of a rotatory one, to be gently given to it. By collision we well know the presence of the stone as much as by the sound ; but let not that suffice. If a calculus is present, it may be brought into the clutches of the instrument, as will be explained in the next section, whether fibrinous, mucous, small, &c. its presence and its size may be ascertained approximatively by closing the forceps upon it. If of a diminutive size, or of a soft friable nature, it may be at once crushed and brought away.

CHAPTER VI.—SECTION II.

OF PREPARATORY MEANS BEFORE THE USE OF
THE LITHONTRIPTOR, WITH OBSERVATIONS ON
THOSE WHICH SHOULD BE OBSERVED BEFORE
LITHOTOMY.

As far as I may depend upon my own judgment, it seems to me that sufficient care is seldom taken to put the patient in such a favourable state of health, previous to the ordinary operations of lithotomy, as may increase the chances of a favourable issue. In England, especially, this is neglected by some of our justly respected surgeons, to a degree that I am at a loss to account for ; and it would create in me still greater astonishment, had I not been inured to it by the habits of my medical education, and by frequent observation of the practice of some of our best surgeons.

On the continent, preparatory means are, to a certain degree, more attended to ; and, besides

emptying the rectum by an enema, to remove mechanical impediment, as is done every where previous to the operation, bleeding, warm baths, are employed on the preceding days, if the patient is feverish or irritable, and the action of the bowels is regulated. Some of the German surgeons administer an opiate before using the knife, to diminish the pain of the patient, and to overcome the consequent spasms, which render the introduction of some instruments difficult, and the action of others dangerous.

If the general principles of pathology we are taught in the schools of medicine are just and well founded, they must be as applicable in calculous disease as in all other cases ; and the neglect of them is to be discountenanced as mischievous and absurd. The relief of a febrile or inflammatory temperament by bleeding, refrigerants, &c. ; the clearing out from the bowels all putrid ingesta, and hardened heating fæces, by suitable purgatives ; the assuaging of irritability, by appropriate anodynes and sedatives, and by the warm bath ; imparting tone to the stomach, and to the frame in general, by light bitters, &c. where great weakness and depression prevail ; appear to me important items of surgical duty.

Hoping that these precautions will not appear

a work of supererogation, to those who consider rather what should be, than what is generally performed, I must still beg leave to state, that in my opinion this is not sufficient, and that it is a most important desideratum, that the bladder itself should be brought, previous to any operation, to a more healthy state. Even in those in whom a stone arises from the accidental introduction of a foreign body, the long-continued motion of such a stone, which is often rugged and angular, creates a morbid contraction and ulcerated state of the coats of the bladder, and by sympathy disturbs the whole urinary apparatus. But when, however, the occurrence of a stone is the result of the breaking up of an abused constitution, of dyspeptic disease, of a gouty diathesis, or is produced by affection of the kidney, prostate, or urethra, the state of the bladder is greatly aggravated. It is much contracted, and as thick and as tough as a piece of leather ; it may be ulcerated, and it is charged with ropy mucus and morbid irritating urine, by which the organ itself, and the urethra, are thrown into constant spasms. To proceed to operate in such a state of things with cutting instruments, appears, to say the least, exceedingly unfavourable. In many cases, if the high operation were to be adopted, the bladder would not

present above the pubis, but that part which is covered by the peritoneum ; and if the lower operation is resorted to, the motion of the instrument will contuse, if not cut, the bladder in many more places than is indispensably necessary.

I do not think, that even with so mild an instrument as the lithonriptor, in an aggravated state of the bladder, it can be advisable to operate without previous remedy ; above all, when, from the particular circumstances of the case, a prolonged catheterism is to be expected. Independent then of the means mentioned before, I should advise, during the previous nights, when the patient is asleep, or if he prefers it during the day, that a current of slightly mucilaginous liquid, or of a decoction of poppy heads, should be made slowly to circulate through the bladder, by means of the *sonde à double courant*, formerly described. The bladder will be then bedewed and soothed by the bland fluid ; the granulous particles, the acrid urine, and morbid mucus, will no longer irritate its parietes ; and what is important for lithotomy, the contraction of the bladder, as well as the spasm of the urethra, will be removed. All that will be required, is, that the fluid should be kept between 26° and 32° Reaum. : and that the patient should so regulate the intro-

ductory tube, that the bladder should never be inconveniently full, and that the current should not likewise have sufficient impetus to move about the stone. As to the patient, he will feel the passage of the soothing fluid a real luxury, and he may either read, write, or sleep. M. Civiale does not think it necessary to adopt the “sonde à double courant.”

The instruments of Mr. Civiale are from two and three-quarters to four lines breadth ; those of Mr. Weiss are rather under this size ; and the following are the dimensions, such as they appear from Sir E. Home’s account, of the casts he had taken of the urethra :

Years old.....	80	30
At $\frac{3}{4}$ of an inch from the external orifice	$\frac{9}{20}$	$\frac{7}{20} \frac{1}{2}$
At $4\frac{1}{2}$ inches.....	$\frac{7}{20}$	$\frac{7}{20}$
At 7 inches (at the bulb).....	$\frac{12}{20}$	$\frac{13}{20}$
In the membranous part, just beyond the bulb.....	$\frac{7}{20}$	$\frac{4}{20}$
In the membranous part near the prostate, $8\frac{1}{4}$ inches from the orifice.....	$\frac{9}{20}$	$\frac{7}{20}$
At $8\frac{1}{2}$ where the membranous part termi- nates.....	$\frac{11}{20}$	$\frac{11}{20}$
At the neck of the bladder at 9 inches..	$\frac{9}{20}$	$\frac{8}{20}$

These casts being taken from the dead subject, they are not exact indications of the size of

the urethra, though, as an approximation, they enable us to decide, that the largest of the instruments in question can be passed, except that in one individual there is one spot which only measured $\frac{4}{20}$, which, no doubt, was the result of disease or of accident. As stricture and diseased prostate are very common in calculous patients, dilatation must be had recourse to ; and even in ordinarily disposed patients, it may perhaps be advisable to accustom them to the presence of an elastic catheter, though it is not strictly necessary in a healthy urethra.

I shall not go completely over the subject of the introduction of bougies, where stricture in the urethra or prostate obstructs the immediate use of instruments. I shall only recall here, that, *cæteris paribus*, those instruments are most difficult of introduction in stricture, which are smallest, as well as those which are the most conical at the point. Formerly, not being sufficiently aware of this, I used to introduce fine instruments when stricture was complained of, and succeeded with great difficulty in clearing the obstruction ; and blood came away from the urethra with the instrument. Having one day been foiled in passing a small instrument, I afterwards succeeded in introducing, with some difficulty, one

much larger ; and ever since, I introduce a large bougie first, and if not successful, try a smaller, and the plan has succeeded. This observation is favourable to the lithonriptor.

To enlarge throughout a small urethra, the elastic catheter had better be employed and left in the bladder for a few hours at a time. To overcome speedily a stricture, Mr. Arnott's dilator will be most effective.

I am persuaded, that in most cases, stricture or diseased prostate will not require long previous treatment. I have now under my care an individual, seventy-five years of age, who has a contraction in the urethra near the bulb, and another in the prostate. By the daily introduction of instruments, and by dilating and soothing the urethra each time by injection, with a syringe, of a little opium dissolved in water, I have brought him to bear the introduction of a lithonriptor near three lines breadth ; and if his timidity can be overcome, in a few days I shall remove the stone with which he is troubled. A curved lithonriptor, to be described presently, will be susceptible of being employed in cases of diseased prostate, of a less yielding character.

There are many cases where the orifice of the urethra is exceedingly contracted, though the

canal itself is not so. In the plate at the end of this volume, is the representation of a small short catheter, containing a sharp blade within it, which may be moved forward with a spring, like the bistouri caché. This instrument may be introduced, and the blade being a little raised when it is withdrawn, the stricture may be *nicked* without the patient scarcely noticing or feeling it. M. Civiale, in whose hands I first saw it, told me it was due to the ingenuity of an English gentleman.

CHAPTER VI.—SECTION III.

OF INTRODUCING THE LITHONTRIPTOR, SEIZING AND FILING THE STONE, AND WITHDRAWING THE INSTRUMENT, &c.

THE ingenious inventor of the lithontriptor places his patient, extended his whole length, on a couch elevated on a table, with a pillow to raise a little his breech, and his head resting on another pillow. M. Civiale has extreme familiarity with his instruments, and he handles them with quickness, delicacy, and precision, and he may not, therefore, be at all inconvenienced by any position of his patient. As to myself, I prefer bringing my patient at least so near to the edge of the table, that his legs may hang down, whilst they are kept separated: the rest of his body may be disposed of as above. Between the separated limbs, the operator may place himself standing, and have the advantage of acting towards the centre of the patient's body, instead of from the side, which, to one who is not an adept, would be inconvenient.

No persons, except those who are exceedingly sensitive or timid, will require to be held; but on the first trial of the instrument upon any individual, it will be prudent to have assistants present. To prevent the spasms that might, perhaps, take place in the bladder, and to obviate that narrowing of its cavity consequent upon the old frequent efforts at micturition, and at expelling the stone, it is proper now to inject a little warm water into the viscus, so as to increase its volume without inconveniently distending it; this is done by the means of a catheter* and of a syringe adapted to it. The lithontrip-tor's three portions are then well bedewed with simple ointment or oil, and then placed within one another, and the different supplementary pieces being attached, the saw and forceps are to have their extremities drawn nearly on a level, and are then withdrawn at once so as to form a very obtuse point to the tube, and they are now immoveably secured by turning the two screws towards the button handle. The body of the instrument may be then bedewed with oil; but it is better to cover the extremity with a little cerate, which will be both soft and rather tenacious.

* The tube made use of may be the same as at p. 103.

The instrument is then taken up like a writing pen, and its point being engaged in the orifice of the urethra, it is pushed down gently and steadily at nearly a right angle with the body, as far in the urethra as possible ; it must now be kept down a little firmly beneath the arch of the pubis, whilst the handle is depressed sufficiently to make it pass with another gentle impulse into the bladder. Here, it should never be allowed to arrive with a sudden jerk ; and if, during its introduction, any obstacle is felt, it is better to withdraw a little, or to keep it gently pressing upon the part for a moment. Fortunately, large instruments are not subject to make false passages, and by stretching the urethra, prevent any doubling of the mucous membrane occurring, which so much obstructs the passage of instruments.

The lithontriptor is now in the bladder, and we must have a mark upon the instrument to enable us to calculate, that not much more nor much less than nine inches and a half remains in the viscus* and its canal, before we expand the

* Nine inches for the urethra and outer tube, and about half an inch for the portion formed by the forceps and saw when closed. This distance must be, however, less in a straight than in a crooked instrument; the relation of the

forceps. The latter is effected by relaxing the screws, then pushing forward the saw and forceps tube, and then retracting completely back, the borer which makes the forceps expand still more. The greatest distance between the branches of the forceps, being laterally at about five lines from their extremities, it is with this part inclined downwards, that we now seek the stone, according to circumstances advancing, withdrawing, or gently rotating the instrument. When the calculus is not easily taken hold of, we may first try to push it into the fangs of the forceps by introducing the finger per rectum, and raising it; or we may make the patient stand up, the instrument being first shut, and then opened when he is in the upright posture; by one of these means we are sure to succeed. The stone once encircled, we retract the forceps, whose points being turned inwards at their extremity, not closing on the part where the stone lies*, but being drawn from it towards a centre, cannot wound the coats of the bladder, when

first to the second approaching to that of the cord to the arc of a circle.

* The lithotomy forceps does the reverse, and we have mentioned the occasional consequence.

properly used. The stone being embraced, holding the body of the instrument firmly with the left hand, we may endeavour, by putting our two first fingers round the outer tube, and our thumb upon the button, (as we would do to push the piston of a syringe,) we may endeavour, I say, to crush at once the stone. If we do not succeed, we may apply the winch at the extremity of the saw-rod, and by alternately boring a little, and then withdrawing firmly the forceps and fixing it, we shall reduce the stone. When we judge that there is only a small portion of it that remains between the fangs of the forceps, we may withdraw it with the instrument. Let me now pause to observe, that if we ascertain, by an instrument mentioned before and represented in the plate, the nature of the stone, we may nearly decide whether we shall want the winch ; for if it is a triple phosphate or a fusible calculus, it will, ten to one, easily give way ; if it is an oxalate of lime or lithic stone, it will resist. When we think we have done enough for once, in consideration of the patient, we leave off the process for the day. I shall now describe what remains to be done after the lithonriptor is laid aside.

One of the terrors of lithotomists has ever

been the fear of breaking the stone, and this with reason, since it has repeatedly occurred that in the hurry of the operation, the stone has been broken unperceived ; or, that in seizing it with the forceps, some portion has remained behind, and in spite of injection, has been imbedded in some coagula that has been arrested by the lips of the wound, or by its adherence to the parietes of the bladder. Thus, another calculus has formed unsuspected ; and another operation has been performed (no gentler means being known of remedying the evil), as frequently as it has been put in practice, on account of another stone having descended or formed in the bladder, from the continuation of the calculous diathesis or of any other constitutional or local cause. And let me just pause here to observe, that it is such considerations as that just presented to the reader which enhances so much the value of our new discovery.

In the present process, the stone is always broken ; but it is reduced to atoms, and every larger portion is pursued and seized with the instrument till its diameter is duly diminished. Mr. Civiale, after allowing the water first injected to flow away, loaded with sand, injects water anew through the silver catheter, which

once more comes away with particles of stone. After this, the patient returns home, where he may take a general warm bath, or only use the hip bath ; and, if irritable, a little hyosciamus or laudanum, in an almond emulsion, may be administered.

To obviate more completely any objection that may be made, instigated by the fear of particles of stone remaining in the bladder, I shall always introduce the straight* silver tube, I have designed in the plate, with a silver ball at the end, held by two small or one strong wire, with a button, shutting up the extremity out of the bladder. This introduced into the bladder, the wire and ball are to be removed ; and the urine having flowed away, water is to be injected ; and, when returning, the large open end of the canula will allow of the entrance of particles of stone even more than three lines and a half diameter, when a sufficiently large instrument has been introduced. I shall mention presently the other use to which this instrument may be applied. I need not prove its advantage in the present instance, since it speaks for itself.

There is another means which I have not

* This tube may be also made curved, for greater facility of introduction

tried ; but which, in my opinion, and in that of a distinguished physician and excellent chemist, whom I have consulted, could not be objectionable. It is well known, that quicksilver can be swallowed, as has been practised in intususception, without producing any chemical effect, and in a case where one of the metallic bougies of late years employed, had broken in the bladder, mercury, in its metallic state, was thrown in, which, forming a fluid amalgam with the bougie, allowed of its being brought away. I should propose then to introduce quicksilver occasionally into the bladder after the process of boring the stone. Its weight, supported as the bladder is by the rectum behind, and by the bones of the pelvis, could scarcely produce any considerable temporary inconvenience ; whilst its greater specific gravity would raise the particles irresistibly from the inferior part of the bladder, and bring them all on a level and into the mouth of the open-ended catheter, with more or less impetus according as the patient would be also more or less raised from his resting place. It might be likewise exceedingly useful in placing a calculus, too large to enter the open tube, within the two-bladed forceps. I throw out this suggestion, leaving its propriety to be established or refuted by my readers' and my own experience.

CHAPTER VI.—SECTION IV.

OF WITHDRAWING AT ONCE STONES FROM THE
BLADDER, AND ALSO OF EXTRACTING THEM
WHEN IN THE URETHRA.

IT is certainly extraordinary that so many renal calculi should be allowed to increase in the bladder, so that they must one day become the causes of operations more or less severe. Some may attribute it to the patient's ignorance, some to the want of acumen, or neglect, on the part of the medical attendant; more generally it is ascribable to the want of proper instruments. Henceforward, when a patient, particularly one of a gouty habit, after complaining for a long time of nephritic pains, is suddenly seized with fever, retching or vomiting, numbness in the upper part of the thigh, as also a darting pain in the course of the anterior superior cutaneous nerve; this accompanied with retraction of the testicle, and spasm and pain in the direction of the ureter;

let the surgeon be upon the watch ; and when all at once these symptoms cease, let him endeavour to seize the calculus with one of the following instruments ; and,

1°. Renal calculi, when small, often come away through the urethra spontaneously ; so that the open-ended tube I have proposed will at once answer the purpose in many cases.

2°. When the stone is larger, an excellent instrument of Mr. Weiss, with which many stones have been extracted, may be employed. By means of a spring, it opens laterally, and then may be made to close upon the stone ; care being taken not to push down too much this splitting catheter, for fear of pinching the mucous membrane. It is figured in the plate 2, with Mr. Weiss's lithontriptors.

3°. In plate 1 is represented a two-bladed forceps, recommended, I think, by the great John Hunter*. This is used with success by Mr. Civiale, and may be employed no less advantageously by us.

Stones are sometimes passed into, and may become imbedded in, the urethra. If it is by the elastic gum cathether we first feel its presence

* If I remember right, it is to be found in Scultetus. The French call it the forceps of *Hallés*.

in the urethra, we may attempt to pass it over the stone; and that being effected, by inclining the eye of the instrument towards the stone, endeavour to engage it, and bring it out of the urethra. If by other instruments we ascertain the presence of the stone, we must withdraw them immediately. The first steps we must adopt, are such as do not endanger the return of the stone into the bladder. We must therefore make the patient drink rather copiously, and at the same time desire him to retain his water for a short time after the wish to void it, is felt. When on the point of voiding it, the patient, making the customary effort, is to press with his finger and thumb for a moment upon the glans, and when the urine has accumulated and distends the urethra, he must suddenly let it pass, and we may hope the stone will come away with it. If this does not answer, and the stone is in that part of the urethra that can be reached externally with the finger, gentle pressure must be tried to expel it, and at all events its retreat must be prevented, during the introduction of instruments to lay hold of it. The open-ended tube, before spoken of, may be tried. It must be of a smaller size than the one sketched in the plate, and it must be passed gently beyond the stone; the hemisphere is then to be pushed

out, whilst the tube is retracted an inch more or less. Within this space the stone is, and now the tube and ball are to be approximated gradually to one another, pressing the latter downwards; and it may fairly be hoped that the stone, if small, will be drawn into the tube, whose whole calibre is open, the wires which hold it being at the sides*.

A small sized instrument of Mr. Weiss's, for withdrawing stones from the bladder, may be advantageously used; but neither in this particular case, nor in that where it was recommended above, should it have so strong a spring as to break the stone, as in these occasions it is useless.

Lastly, here may be also used the two-bladed tube-forceps, which is an excellent instrument.

For the extraction of the porcelaineous stones of the prostate gland, the instrument of Mr. Weiss and the tube forceps may be used. With the former, sixty small calculi have been removed in one single case, and 85 in another†.

When a stone is so imbedded in the urethra that it really cannot be moved by gentle means,

* If the stone will not enter the tube, on account of its size, it may be withdrawn, and the hemisphere and wire left in the urethra; which, when retracted, may bring away the concretion.

† Vide Medico-Chirurg. Trans. vol. xii. p. 389.

a button-hole incision must be made ; and an operation will be more frequently required for the removal of stones in the prostate, in whose substance they imbed themselves occasionally in such numbers and so deep, as to brave all our efforts.

Richerand, in mentioning the thought that occurred to Desault, of joining the forceps to the catheter, regrets that it did not succeed, since, in this way, we might draw away foreign bodies that have slipped into the bladder before they become the nucleus of stone. The reader will see in the above instruments the wish of Richerand accomplished. It is needless to explain how they are made to effect the desired object.

CHAPTER VII.

ON WEISS'S LITHONTRIPTORS.

WE must now turn our attention to Mr. Weiss, as being the inventor of instruments, which have the same object, and which have originated from the same idea as Dr. Civiale's, the first discoverer. Mr. Weiss not having been able, at this distance, to obtain any correct model of the Doctor's lithonriptor, determined upon manufacturing an instrument similar to it, from the notion given to him of the capabilities of the straight metallic catheter. We have had often to mention with praise his instruments in this work, and we do not find here less reason for praising his creative abilities. We must beg leave to refer the reader to the plate, to comprehend the nature of this instrument. It will be seen at once that it possesses decided advantages in many respects, even over the one we have described, though, if we were confined to one in-

strument alone, I think we should prefer the latter. The instrument closes at its extremity, so that it presents a perfectly polished, equal, rounded surface. The diameter of the instrument is mediocre, and it has a good firm handle, close to which is the pulley through which the string of the bow acts, whilst you retain a strong hold of the instrument. The contrivances by which the other parts of the mechanism are made to act, are beyond any praise I can bestow.

Of this first description of lithonriptor two kinds have been manufactured, the first having two blades, the second three. To take hold of a large stone, the first is preferable ; for seizing a small one, the second is better adapted ; and I cannot agree with the inventor's opinion, that it seizes calculus less readily than the other. A middle sized stone might elude the grasp of the two-bladed instrument ; but when the three-bladed lithonriptor closes round a stone, it is scarcely possible it should escape. The curved shape of the three-limbed forceps of Mr. Civiale, which closes more quickly at its extreme ends than in the centre, together with the separation between each of the three members, admitting easily of an inch and a quarter calculus in breadth, is what renders it so serviceable. What we con-

sider objectionable in Mr. Weiss's instrument, is the teeth with which it is provided internally, as also the hooked termination of the instrument. In the place also of the present centre piece, I think a saw, like one of Mr. Civiale's, might be advantageously used. The latter could be easily effected, and the former inconvenience may be as easily remedied. Taking it, however, as it is, I think it is a most serviceable contrivance, and should the inventor even improve upon it, its present form should also be retained, as most useful in particular cases. I think the forms of the lithontriptor and of its collateral assistants, cannot be too much multiplied, if we wish to extend as far as it is indeed susceptible, the range of its applicability and use; and I shall take care to place amongst my instruments all the forms known. It is for the reason just mentioned, that I really rejoice at the existence of another lithontriptor, invented by Mr. Weiss, and which, in so far as that it is curved, and has an entirely new mechanism, is a conception superior to the former. We must trouble the reader once more to have recourse to the plate, and to the description annexed to it. It is a curved instrument, and therefore is easily introduced into the bladder; when there, it opens

like the maw of a many-toothed fish of the eel kind, and when the stone is within its blades, it may again be made to close upon it. By moving the lever, a small saw then descends upon the stone, and may be worked backwards and forwards by this ingenious contrivance near the handle. Whilst the saw is working, the saw-toothed blade of the instrument is pressing on the groove that is forming, and no doubt the stone must frequently give way, long before the saw is clearly through it. It must be avoided, with this instrument, to push too much forward in the bladder, as it might possibly happen that the blade should suddenly pinch the mucous membrane, notwithstanding its being distended; since the bladder is always contracted, as we said before, in calculus. The implement by which the stone is grated not having a large surface, this instrument will be more serviceable in the destruction of middle sized calculi, than in the reduction of larger, which it might at first only cut in two, if they were of a hard substance. It is above all, when the urethra has been formerly much strictured, and is ulcerated, or when any other obstacle exists to the passage of a straight instrument*, that this lithontriptor will be invaluable.

* In my preliminary observations, in the Appendix, will be found a few remarks as to the improvement of this instrument.

able; for the existence of a large calculus will not be an insuperable obstacle*: besides the probable chance of its being shattered in the process of sawing, we may return to its attack more frequently; and the urine or warm water that may be injected acting on the new-cut surface, will dissolve in some degree the cementing mucus, and render the stone more open to mechanical impression.

I think it unnecessary to speak here at greater length of the mode of using the lithonriptors of Mr. Weiss, as what has been before observed on that of Mr. Civiale is applicable to the present, with a few evident exceptions. The first instruments of Mr. Weiss have been used with success by a few surgeons; but stones much more considerable than those extracted, are capable of

* An ingenious friend has justly observed to me, that, as every common curved tube we introduce into the bladder, when it has reached this viscus, has only its straight portion in the urethra, and lies there without inconvenience to the patient, we could not, *a priori*, imagine it difficult to introduce a straight instrument. This renders more extraordinary the tardive *re-discovery* of the applicability of the straight sound. I forgot to mention in the proper place, that a French professor told me that Dr. Amusat had described long since, in his work on the urethra, the use of a straight sound.

being removed by his lithontriptors. The second ingenious form just spoken of has not yet been tried ; but it is evident that it is susceptible of conferring, like all the other instruments mentioned, immense benefit on some of the most suffering of our fellow-creatures. I have before alluded to it as a great resource where diseased prostate exists with stone, in the same patient.

In the Appendix, the last cases published by M. Civiale will be found, translated for the reader's use. What I possess of experience on the subject of this volume, beyond what I have had the pleasure of diffidently suggesting, I am desirous at present not to dilate upon. I shall soon have, I hope, a sufficient number of cases to offer to those who are interested in the subject, and more varied observations on the use of the lithontriptor. Till then, I trust my readers will acknowledge that I have set before them such a number of modes of relieving persons affected with calculus, that if they are followed up, and duly matured, gentle means must in general suffice to its removal. When this will be accomplished, I need not say how much it will redound to the honour and fame of our profession ; and I shall then congratulate myself upon having been the humble means of placing in

the hands of the most distant of our brethren, weapons that may be used by all those duly qualified, without anxiety and without risk. In bidding adieu to the subject for the present, and, looking back on the road I have travelled, I feel the most sincere apprehension of having allowed many omissions and mistakes to creep in, in my hurry to arrive at the conclusion*. If it is so, I trust I have sufficiently traced the path, to enable a better writer, and one not confined to the period of ten days by the attention required by another work, to relate a journey more redolent of incident and instruction.

* As some persons may think I have not been sufficiently careful in indicating the pages and volumes of writers, whose authorities I have cited, I beg leave to observe, that writing in haste, and from memory, in many cases it was impossible; and that, in others, the instances quoted were so familiar, that it would, in a volume so compendious as the present, be as irrelevant a display of erudition as the quotation of Latin distichs, or the employment of any other of those ornaments, which are the resource of author craft.

APPENDIX.

PRELIMINARY OBSERVATIONS.

I HAVE annexed to this Essay an Appendix, which will obviate the absence of any details the reader may still require, and afford illustrations of the successful employment of the *Méthode Civile*. This Appendix consists of the favourable report of the Baron Percy to the Academy of Sciences, and of the cases of Dr. Civile. I have taken the liberty to abridge these memoirs, both in order not to render too considerable this little volume, and because ample reports have been already published, as the reader may see by referring to the *Lancet*, for July the 9th. Those who wish to derive complete information from my little Essay, must read these cases, as I have forgotten to mention how frequently the lithonriptor may be employed, in how many trials it will probably produce the desired effect, &c. M. Civile has not yet given any details sufficiently comprehensive of the cases in which the lithonriptor should or should not be employed; nor has he spoken of the diagnostics of the contra-indicating states of the constitution, or of the urinary apparatus. I have not myself had time to do this; but, should a second edition of this volume perchance be demanded, I shall supply, as far as is in my power, this omission. In the mean time, when I consider the superior information of those persons in whose hands my Essay will fall, I do not

fear their being at a loss to fill up a void which is only necessary to the *ensemble* of the work.

Many cases will be found in the following pages; but the reader will have the kindness to observe that they only reach till May, and that since then many operations have been performed. I witnessed one by M. Civiale himself, only five weeks ago; and there is now a well-known mercantile character in London who has lately been cured.

Every day confirms me in the persuasion of the great range of applicability of our present method; and proves to me, that obstacles become less numerous as opportunities of experience increase. A few days since, in the presence of an experienced physician, and of another member of our profession, I introduced into the bladder of a person afflicted with diseased prostate, and in whom I discovered a partially encysted stone, every lithontriptical instrument invented, and liberally lent to me for the occasion by Mr. Weiss; even a straight lithontriptor of his, of small volume, though it could grasp a one and a half inch calculus, went in at first trial, with a rapidity which I had not the intention to impart to it: spasm of the urethra rendered afterwards its introduction less speedy*. Those who wish to refer to cases of the successful employment of Mr. Weiss's stone-breaker, may consult the Medico-Chirur-

* I merely allude to this trial, to prove the easy introduction of these instruments, and therefore the principal obstacle is removed.

gical Transactions, or a volume published and sold by Mr. Weiss.

I should advise those persons who intend to purchase either of Mr. Weiss's lithontriptors, to have his curved lithontriptor, made an inch longer and a little narrower at its opening part *. In the straight lithontriptor it will be advisable to be provided with an indication, to denote when the boring lance is placed in a direction to allow of the easy closure of the instrument. In this occasion, and in others throughout this Essay, I have recommended precautions to be observed, which some persons have not thought necessary; but I feel anxious that the first essays of different surgeons should not be liable to the least accidental misfortune, which may in its infancy crush a most salutary discovery.



APPENDIX No. 1.

Extract from the Report of M. M. Chaussier and Baron Percy, to the Royal Academy of Sciences.

AFTER an elegant and erudite introduction to the subject, Baron Percy, the writer of the report, proceeds to say, that he has seen the process of destroying stone in the bladder tried in the dead and in the living with a rapid and successful effect; and that in the

* It would be a great improvement if, by some ingenious mechanism, which the inventor is so capable of supplying, we could learn in the handle how many turns we must make before the chaps of the instrument can come in contact.

latter he has had occasion to convince himself, that the bladder is entirely screened from any lesion that might be produced by the lithonriptor's action. Here follows the summary of the trials of the lithonriptor at which he assisted.

FIRST CASE.—January 15th, 1824, Joseph Gentil, 32 years of age, was operated upon, after suffering from stone for four years. The patient placed himself upon a bed, and M. Civiale succeeded at once in pushing his instrument as far as the stone, and in seizing it with the forceps. A noise was then heard by the assistants, like the breaking of a hard oxalate of lime calculus. After 40 minutes use of the instrument, Gentil got down from his bed, and returned the water injected into his bladder, together with a quantity of calculous particles. The 24th, same month, and 3rd February, returned again to witness the process, with some of his eminent brethren, and on the latter day the patient was entirely delivered of his stone. A few hip-bath injections, and the use of appropriate drinks, were the only means employed to second an operation, which, from a melancholy and suffering young man, rendered the patient the liveliest and the most happy. P. 31.

The **SECOND CASE** was that of — Laurent, from Rheims. In this patient a calculous concretion had formed round a French bean, as was eventually discovered. The patient's bladder was very irritable, and contractile, and, after the first attempt, leeches were applied, and emollient injections administered. In

four sittings the patient got rid of his stone; as M. Souberbielle, the eminent French lithotomist, convinced himself by investigation with the sound. The patient in a few days returned to Rheims in an ecstasy of joy. P. 34.

THIRD CASE.—The patient prepared himself spontaneously for the operation by dilating his urethra with bougies. Before M. Civiale proceeded to operate, he slightly *nicked* from within the orifice of the urethra, to overcome its contraction; this enabled the lithontriptor to act with celerity and efficacy; and in three sittings the patient was to all appearance cured. In this case the long tube forceps was used with great success.

M. Percy concludes his report by mentioning the cases in which he thinks the lithontriptor not applicable; viz. when a stone has an extraordinary dimension, greater than the inch and half expansion of the forceps will embrace; when the stone is encysted, another rare occurrence, in which case the stone is not painful; when the stone has for nucleus exceedingly hard foreign bodies, as bullets, the splinter of a bomb, the tube of a pipe, &c. as sometimes has occurred.

M. Percy then adds, that he thinks the “Méthode Civiale” applicable to children, provided they are not in their first infancy; and he concludes with saying, that this new process is glorious for French surgery, honourable to its author, and consoling to mankind.

The translator must observe, that the first medical characters in France were present at the above operations.

APPENDIX No. 2.

Extracts from Observations in continuation of the Memoir on the Lithonriptor, by Dr. Civiale, inserted in the Archives Générales.

THE favourable reception which has been given to my former memoir on the present subject, has engendered the hope that the present observations will be received with equal indulgence.

Since the reading the report on my memoir, by M. M. Percy and Chaussier, in which my success, in three cases, is related, I have had the opportunity of treating a considerable number of calculous patients. These cases having differed in their characters, have required some changes in my apparatus, and have furnished me with the opportunity of making the following observations.

§ 1. *Patients in whom the operation has been expeditious and easy,* The commissioners in their report regret that they have not been able to meet with a female on whom to try the *Méthode Civiale*.

OBSERVATION 1.—The opportunity presented itself shortly after, in the person of Mrs. Delange of Arpajon, near Paris, 72 years of age, and exhausted with fatigue and pain. The introduction of the instrument in this case, was not at first as easy as was expected, but

once introduced, it easily grasped a stone the size of a small walnut, and so brittle that the pressure of the forceps alone would have sufficed to break it. The smaller particles of stone were voided with the urine, and the remainder were withdrawn five days after, in presence of M. Richerand. Madame Delange, freed from the stone, has recovered health, strength, and plumpness. Nothing remarkable was observed in this case.

OBS. II.—M. Maud'huyt, lieutenant of the navy, at Brest, labouring under stone, came to Paris in the month of June. He was cured in two sittings, at which M. M. Serres, Fabrépallat, &c. assisted. In seventeen minutes the whole business of seizing, boring, and of withdrawing the two portions of a stone, of the size of an almond, was accomplished, at the first meeting. During this time, the patient did not cease a moment conversing with the persons present, and with Mrs. Maud'huyt, who did not leave him. The second sitting lasted only twelve minutes, and another stone, smaller, was seized, broken, and withdrawn, its nucleus remaining in the bladder, from which it was extracted a few days after. This nucleus consisted of oxalate of lime, covered by a lamina of lithic acid.

OBS. III.—M. Azile, keeper of the palace of the Tuilleries, had entered a maison de santé to be operated upon by M. Dupuytren, but, terrified at the apparatus of cystotomy, he applied to me. The 17th, 21st, and 28th of last October, were the days in which

the cure was begun and accomplished. He had suffered several years from the stone, which could not be reached whilst sounding with ordinary instruments, but which was easily discovered by using the lithontrip-tors. M. M. Dupuytren, Deveze, &c. &c. witnessed the operations. The patient's bladder was examined on the 5th of September following, in the presence of M. Albert, and the patient's cure was proved to be complete.

OBS. IV.—M. Perin Le Page, No. 15, Boulevard des Capucines, had borne for some time a stone, from which he was delivered in three sittings, in the presence of M. M. Richerand, Brown, &c. During one of the intervals betwixt these operations, M. Le Page experienced one of those violent attacks of nephritic colic to which he was subject since the appearance of the first symptoms of stone, and of which he has had no return since it has been removed.

The family of this individual offered a remarkable example of the hereditary nature of the terrible disease of the stone. His mother and one of her grand children were threatened with it; and another lately died of it. I was preparing to operate upon the latter, when, having recognized considerable organic disease, of both kidneys, I dropped my intention. The p. m. examination of this child, who died five months after, proved these organs to be very voluminous, and in a putrid state.

OBS. V.—M. B. a Captain in the First Regiment of Chasseurs, had been labouring for five years under

a calculous concretion, of which I delivered him in six sittings, at distant periods, which were required on account of the imprudence of the patient in regard to diet, &c. M. M. Richerand and Jules Cloquet witnessed the facility and the little pain occasioned by these operations. I have met since the above gentleman, and he has recovered the health of which the stone had deprived him.

OBS. VI.—Six sittings were also required to remove two middle-sized stones from the bladder of M. Desprets, where they had remained for four years. The operations were performed in presence of M. M. Demours, &c. M. Desprets, whom one of our distinguished surgeons had endeavoured to dissuade from submitting to my method, is completely cured, without having experienced the least febrile excitement.

OBS. VII.—A stone of the size of a large walnut, which M. Remond had borne for several years, has required for its removal seven sittings, at which M. M. Breschet, Dubois, &c. &c. were present. The patient, though of an exceedingly irritable constitution, has not experienced, during the treatment, the slightest access of fever.

Cases in which the treatment has been prolonged and difficult, and the cure sometimes uncertain.

Every patient cannot experience, in the employment of my method, a cure as speedy and as easy as

in the above cases. Some have borne, for a number of years, stones that are either very numerous or very voluminous, and which require for their removal repeated use of the lithonriptor. A certain number of calculous patients, in addition to voluminous stones, labour under organic disease of the bladder and kidneys, accompanied with the discharge of pus. In others we meet with an acute sensibility of the bladder, to such a degree, that the introduction of catheters occasions alarming symptoms. It is in such cases that the practitioner experiences difficulty and uncertainty.

In operating, he must fear, lest, during the interval, any aggravation of the pathological state of the organ should spontaneously arise; which, by putting an end to the patient's existence, may induce many to believe that it is the consequence of the operation; though it may be totally independent of it.

In such a case, to attempt nothing for the patient is a breach of duty, and, convinced both by well-grounded experience and reasoning, that the new method, employed with prudence, diminishes in nothing, when it fails, the chances in favour of lithotomy, I do not fear to employ the former in doubtful cases; at the same time forewarning the patient on the uncertainty of a successful issue. The following are the results of seven cases of the kind that have fallen under my care.

OBS. VIII.—M. Le Baigue, Rue Tiroux, No. 7, an old asthmatic gentleman, exceedingly corpulent, had been suffering for years from a very large stone, which

I attacked with my instrument last July, in presence of M. M. Marc, &c. &c. The destruction of the calculus was accomplished in ten sittings, at each of which a great detritus of stone was brought away in consequence of the use of a full-sized lithonriptor. It was for this occasion that I had constructed an instrument of four lines breadth; the largest I have ever used. Notwithstanding his corpulence, his asthma, and the size of the stone, which made it elude the grasp of my instrument several times, M. Le Baigue obtained a complete cure. Four months after, M. Le Baigue, who had been complaining of pain in the right hypochondriac region, was seized with violent pain in the lower part of the chest, extending down to the thigh and leg on the right side, and, in spite of the best advice, sunk under his complaint. In the p.m. examination was discovered an immense abscess, extending from the diaphragm to the crural arch. The kidneys and large lobe of the liver were found disorganized. *In his bladder, which was healthy, no vestige of stone was found.*

OBS. IX.—Of all my patients, the one whose treatment has been most prolonged, is M. C * * *. The volume and the number of his stones have required for their destruction twenty-eight sittings, at which M. M. Serres, &c. assisted. They have occasioned but two slight febrile commotions, which lasted only two hours; and the patient did not cease to attend to the labours of his closet. I remarked in M * * * that the bladder, instead of being prejudicially affected by the

frequent introduction of the instruments, lost its morbid sensibility; so that the operation became every day less inconvenient. The same circumstance was observed in the following case.

OBS. x.—The present case, that of M. Thubeuf, Curate of Nogent-Le-Roi, has not been less remarkable for the number of stones extracted, than the former was for the number of times the instruments were introduced, without any unfavourable result. In the present case, sixteen stones were withdrawn, sometimes entire, sometimes broken, and several measuring eighteen lines in circumference. M. M. Richerand, &c. who assisted at these operations, are of opinion that M. Thubeuf's calculi were of renal origin.

The difficulties which M. Dupuytren experienced in sounding for the stone, and those I myself met with, the favourable change in the urine after the extraction of the four first calculi, the change of colour remarked in those extracted after a violent nephritic colic, which required a six weeks' pause in the instrumental treatment, the fixed and constant, though dead pains which the patient experiences in the left kidney, proving the former stones to have come from the kidney, do not leave us without apprehension on the state of these organs. M. Thubeuf however enjoys at present the best health, in spite of his acute sensibility. During the latter part of my attendance, I withdrew from him a calculus every other day, without his experiencing the least inconvenience from it. The treatment of M. Thubeuf has proved to me, that an enlargement of

the prostate does not oppose to the new method as great an obstacle as I had first imagined.

OBS. XI.—M. C. seventy-two years of age, was in a state of weakness and exhaustion approaching to marasmus. He had borne, for a number of years, several rather voluminous stones, whose destruction I undertook on different occasions, in the presence of M. M. Montaign, Brown, &c. At the moment his vital energies seemed disposed to reassume the mastery of disease, and when he approached to complete restoration, this individual was seized with violent gastritis, of which he died in ten days. The *autopsy* which took place a few days afterwards, showed the traces of an intense inflammation of the stomach and intestines. The bladder, which contained a very small fragment of one stone, and the third of another, did not present any remarkable appearances. The mucous membrane was slightly *phlogosed*, &c. &c.

OBS. XII.—M. B. likewise was troubled with a voluminous stone, of several years' date, and his bladder presented all the symptoms of being thoroughly disorganized. From the circumstances of the case, I refused to operate. The patient was cut for the stone, and died from the consequences four months afterwards, though the operation had been well performed.

OBS. XIII.—The extreme irritability of M. T.'s organs, prevented my operating in this case, in which lithotomy was successfully employed.

OBS. XIV.—To M. Le Blanc de la Valiere, I also recommended cystotomy, from his unfavourable dispositions for the use of the lithonriptor, with which, however, I had withdrawn from him a portion of stone. Though in appearance a fit subject for lithotomy, M. Le Blanc died three days after being cut for the stone, &c. &c.

I will not detain your attention upon other cases, where the long continuance of the stone had caused great disease of the bladder, which only admitted of palliation, and where I refused to operate.

Before concluding these observations, I shall observe on the little importance of some objections that have been made to the new method, and which bear an appearance of being well founded.

It is not at all necessary, in general, to dilate the urethra before the use of my instruments; and if I introduce elastic catheters before the operation, it is only to accustom the canal to the presence of instruments, &c.

The length of the treatment required has been much exaggerated. To this I answer, that two of my patients have been cured in less than a quarter of an hour: each of them had in his bladder a stone as large as a nut, which had only been there for a few days. The stone of Madame Delange was as large as a walnut, and it was broken and brought away in ten minutes; it was, it must be confessed, uncommonly brittle. When the stone is very large, it requires undoubtedly several trials to bring it entirely away; but this will

not be accounted of so much consequence, when it is reflected, that the patient, during the treatment, does in general scarcely change his ordinary habits of life; that he observes no regimen, and is not confined to his house, except on the day of the operation; that the next and following days he rises, walks, eats, drinks, and attends even to his business, provided it is not of a violent nature; in fine, that the most perfect health follows the egress of the last particle of stone*.

Doubts have been expressed with respect to the solidity of the lithonriptor, and fears as to the lesion of the vesical parietes. These fears disappear at once when the form and mechanism of my instruments are examined. With respect to any anxiety that may exist in regard to any particle of stone being left behind, that might create fresh disease, it suffices to consider the form of the forceps, whether that with three or that with two branches, with which even the finest detritus has been withdrawn after an operation, and to remember how capable the urethra is of allowing a spontaneous passage to the detritus, and even to considerable fragments of stone, to be convinced how little foundation there is for this alarm. As to the irritation which broken and angular pieces of stone might be supposed to create in the bladder, all that is required to dispel this fear, and all the other objections, is, to consult facts and experience, which will silence all ar-

* Here follow half a dozen lines, in which this picture is contrasted with that of lithotomy.

guments of the kind; *unless cures of two years' date may still appear doubtful.*

From the above facts we come to the conclusion,

1°. That the lithontriptical method is applicable in the majority of cases of calculus; that is to say, in those where the stone does not exceed an inch and a half diameter, and where it has not produced too much local disorganization, and constitutional disturbance.

2°. That its application is more successful, and the recovery more expeditious in proportion to the shortness of the duration of the disease.

3°. That the obstacles which may prohibit its application, arising from the length of time the disease has been allowed to continue, and not from the nature of the complaint, will go on decreasing; because the patients will loose no time before they apply for the operation: for, if they endure so long the cruel pains excited by the stone, without seeking relief, it is on account of the extreme severity of lithotomy which they see in perspective.

4°. That when, from particular circumstances, lithotomy* is not followed by a successful issue, it diminishes in nothing the chances in favour of cystotomy.

5°. In fine, that the introduction of lithontriptical

* As lithotomy means, literally, *cutting stone*, Mr. Civiale applies this word to his own method, in opposition to cystotomy, which conveys the more correct meaning of cutting the bladder.—Transl.

instruments, and the necessary manœuvres requisite for seizing and boring the stone, do not of themselves induce any kind of danger; provided they are not resorted to injudiciously, nor by persons who are not qualified.

As to the doubtful cases of which I have spoken, the means that our art affords of ascertaining the degree of disturbance in the living organs, and those which are employed to antagonize the morbid action, being very uncertain, we must await, from time and further experience, the information which the practitioner must infallibly reap from them, and which will become the subject of fresh observations.

PLATE I.

Fig. 1.—Represents Colonel Martin's file, enclosed in a tube, and to be used to bring away a portion of calculus from the bladder for examination. It may be made straight as well as curved. *r* is the ball to fill up the tube during introduction; *s* the file; *t* the caoutchouc, which prevents the file attacking the canula *u*.

Fig. 2.—Is the tube forceps used so successfully by M. Civiale. The blades of the forceps, when retracted, form an obtuse point to the instrument.

Fig. 3.—Is the borer's rod of an improved lithonriptor of Civiale, graduated.

Fig. 4.—Is an improved lithonriptor of Civiale nearly closed. *M* is a gold rim to reinforce the extremity of the outer silver tube; *n* is the screw by which the forceps tube is fixed in the situation we wish; *o* is this tube graduated, that we may know how far or how near it is to its place; *p* is the screw which fixes the borer when we wish it; *q* is the button or wheel, by means of which we press the borer against the stone to crush it, and to which the bow, when used, is applied: it occupies the place on which I affix the winch.

Fig. 5.—Is the lithonriptor of Civiale, as first employed by him. *a a a* are the three expanded branches of the forceps, at an inch and a half from each other;

b is the borer at its utmost projection ; *c c* is the steel outer canula ; *d*, &c. are the two screws to fix the forceps tube and the borer ; *g* is the screw at the end of the borer's rod, to receive the winch ; *f* is the screw to fix the winch at its proper height ; *h* is the winch itself.

Fig. 6.—Is one of the forms of dilators employed by Mr. James Arnott. *a a a a* is a canula by which the urine may run off ; *d d d* a distensible tube of silk lined with gut, surrounding the former ; *b b b* the small canula through which the distensible tube is inflated from the bag *f*, *e* being a stop-cock to retain the air after injection ; and *c c* a bit of tube connecting the cock to the air tube, so that touching the cock by the syringe or bag, may not jar the dilator in the tender passage.

Fig. 7 and 8.—Are heads of different forms for the borer of Civiale.

Fig. 9.—Is an old contrivance for dilating the female urethra in a parallel direction.

Fig. 10.—Is one of the female dilators of Weiss represented open. To close the instrument as well as to open it, it is sufficient to turn *A* ; the numbers below point out the direction in which it is to be turned ; *B* is made use of to stop the dilatation.

Fig. 11.—Is the spring knife catheter ; *a* the short catheter ; *b* the blade raised by pressure of the thumb on the spring *c*. This is a rough representation of the instrument. Mr. Weiss, who will manufacture it if desired, as well as all the other instruments, can easily make one where the spring, &c. is completely concealed.

Fig. 12.—Is the *sonde à double courant* apparatus; *f* is the reservoir of the liquid to be injected; *d* the flexible tube commencing at the stop-cock *e*, by which the liquid is conveyed to the inner catheter *a*, which then carries it into the bladder, opening at *a*; *b b b* is the outer catheter, by which the fluid returns with the urine, and is directed to a proper receptacle by the flexible tube *c*, of any desired length.

Fig. 13.—Represents the open-ended canula mentioned several times in the Sixth Chapter, and proposed to be used for injecting the bladder, for withdrawing calculous particles and small stones from it, as also for withdrawing them from the urethra; *a* is the hemisphere, that, when retracted, closes the tube; *b b* are the wires that hold it, between which is represented a small calculus; *d* is the tube; *c* the screw by which the wires, which join internally, are fixed at any convenient point.

For a more complete description of the above instruments and of their uses, the Work must of course be referred to.

PLATE II.

WEISS'S INSTRUMENTS.

Fig. 1.—Straight lithonriptor. *A* the screw which secures the slide in its position; *B* the head of the slide for opening or shutting the instrument, by draw-

ing it backwards or pushing it forwards with the thumb; *C* a slide for moving the borer forward or backward as desired; *D* the brass wheel to which the borer is to be attached for drilling the stone with the borer; *E* a slit at the end of the bow to receive the knot of the string after it has passed through the wheel *D*; *I* a screw for tightening the bow*.

Fig. 2.—*F F* the blades of the above instrument opened to their utmost extent; *G* the borer.

Fig. 3.—A three-branched lithonriptor of Weiss.

Fig. 4.—An instrument for withdrawing stones from the urethra and bladder. The instrument opens by pushing *B*; *C* regulates this effect.

Fig. 5.—Curved lithonriptor of Weiss. By turning round the handle *A* in one direction, the instrument is opened; by turning it in the other, it powerfully presses on the stone; by pushing forward *B*, the little saw *C* is secured, with the hand, at the point *D*; by retracting *B*, the saw falls on the stone within the separated blades of the instrument, and may be worked

* To open the instrument, loosen *A* by unscrewing it a little, and draw the slide *B* towards you. To close the instrument, bring the notch in the wheel opposite to the groove and push *B* forward. When the instrument is in the bladder and opened, the borer must be withdrawn, by bringing *C* towards you; and when the instrument is closed upon the stone, *A* must be tightened, and *C* again moved forward, which will bring the borer *C* in contact with the stone; when the latter will be perforated by moving the drill bow backwards and forwards, and pressing *C* gently forwards.

backwards and forwards on the calculus, whilst the blade presses most powerfully into the groove, and crumbles the concretion.

In this plate are represented a few of the stones withdrawn by the stone-seizer, Fig. 4.

THE END.

PREPARING FOR THE PRESS,

BY THE SAME AUTHOR,

ELEMENTARY VIEWS

OF

THE PHILOSOPHY OF MEDICINE.







